EPA WORK ASSIGNMENT No.: 0762JZZ
EPA CONTRACT No.: 68-W8-0110
EBASCO SERVICES INCORPORATED

ARCS II PROGRAM

DRAFT
SITE INSPECTION PRIORITIZATION REPORT
BROCKWAY MOTOR TRUCK SITE
CORTLAND
CORTLAND COUNTY, NEW YORK
CERCLIS No.: NYD980203111
JULY 1995
VOLUME II OF III

NOTICE

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Reference 15

Cortland County Health Department
Division of Environmental Health
60 Central Ave. P.O. Box 5590
Cortland, N.Y. 13045
607-753-5035

10 March 1995

Jeff Martin
Ebasco Environmental
Suite 435
2111 Wilson Blvd.
Arlington, VA 22201-3001

Re: Ground Water Information, Site in Cortland, New York

Mr. Martin:

I have attempted to provide the information that you requested herein. Please note that the information is incomplete due to the age of some of the wells.

Cortland Water Board--3.5 MGD, 20,000 served, 5000 connections

Well	depth (ft)	feet of screen	latitude	longitude	%use
Well #3	77	32	42°53'42"	76°11'53"	80
Well #4	77	52	42°53'47"	76°11'49"	10
Well #5	54	20	42°35'48"	76°11'43"	10

Cortland City Water is the only water supply that has experienced any incidence of contamination in the past, but the sample results never contravened water supply standards. The contamination was the result of a trichloroethene spill that occurred at the Smith Corona Typewriter Plant, although blame was never admitted. An air stripper was installed at the plant in anticipation of the plume.

Cortlandville Water Dept.--0.6 MGD, 4000 served, 1200 connections

Well	depth (ft)	feet of screen	latitude	longitude	%use
Well #1	65		42°34'41"	76°12'40"	13
Well #2	65		42°34'41"	76°12'41"	12
Well #3	64		42°34'42"	76°12'40"	25
Lime Hollow	92	22	Lime Hollow Rd.		50

Newton Water Works--Village of Homer--0.9 MGD, 4400 served, 1248 connections

Well	depth (ft)	feet of screen	latitude	longitude	%use
Well #2	75		42°38'35"	76°11'25"	0
Well #3	83	30	42°38'33"	76°11'27"	100

Village of McGraw--0.1 MGD, 1300 served, 412 services

Well	depth (ft)	feet of screen	latitude	longitude	%use
Academy #1	138		42°35'36"	76°05'48"	50
Academy #2	143	12	42°35'36"	76°05'48"	50
Bennett St.	140.5	12	42°35'30"	76°06'11"	0

Polkville, the area between Cortland City and the Village of McGraw, has many individual and public water supply wells. The public water supply wells consist mainly of restaurants and motels.

Blodgett Mills is also a small hamlet also in the survey area. It is served by individual water supply wells.

I have highlighted these important areas on the map. Please contact this office if we can be of any more assistance.

Sincerely,

Peter W. Rynk

Peter W. Rynkiewicz
Asst. Public Health Engineer

Enclosure


WELL
WELL
CORTLAND
Homer
Carr Hill
Hicks Hill
CORTLAND WELL#5
WELL#6
WELL#4
NEW WELL
BENNETT STREET WELL
ACADEMY STREET WELL
CORTLANDVILLE WELL#1,2,3
SMITH CORONA
CORTLANDVILLE LIME HOLLOW
South Cortland
CORTLANDVILLE
TIOUGHNIOGA

Reference 16

Notification of Hazardous Waste Site

Washington ...

...initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

NYS 000 001 394

A Person Required to Notify:

Enter the name and address of the person or organization required to notify.

Name: Mack Trucks, Inc.
Street: 2100 Mack Boulevard, Post Office Box M
City: Allentown State: PA Zip Code: 18105

B Site Location:

Enter the common name (if known) and actual location of the site.

NYD 980203111

Name of Site: Brockway Motor Trucks (inactive operation and site)
Street: 106 Central Avenue
City: Cortland County: Cortland State: NY Zip Code: 13045

C Person to Contact:

Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title): Mack Trucks, Inc.-Legal Department
Phone: (215) 439-3116

D Dates of Waste Handling:

Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year): 1969 To (Year): 1977

E Waste Type: Choose the option you prefer to complete

Option 1: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☒ Inorganics
3. ☒ Solvents
4. ☐ Pesticides
5. ☒ Heavy metals
6. ☒ Acids
7. ☒ Bases
8. ☐ PCBs
9. ☐ Mixed Municipal Waste
10. ☐ Unknown
11. ☐ Other (Specify)

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical, General
9. ☐ Plating/Polishing
10. ☐ Military/Ammunition
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☒ Other (Specify) 400 (Truck assembly and related operations)

Option 2: This option is available to persons familiar with the Resource Conservation and Recovery Act (RCRA) Section 3001 regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous waste listed in the regulations under Section 3001 of RCRA. Enter the appropriate four-digit number in the boxes provided. A copy of the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the site is located.

JUN 30 1981 ... 53
RECEIVED
RCRA ...
EPA ...

Form Approved
OMB No. 2000-0138

. Quantity

...n X in the appropriate boxes to ...ate the facility types found at the site

...he "total facility waste amount" space ...ve the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres

Facility Type

1 ☐ Piles
2 ☐ Land Treatment
3 ☐ Landfill
4 ☒ Tanks
5 ☐ Impoundment
6 ☒ Underground Injection
7 ☒ Drums, Above Ground
8 ☐ Drums, Below Ground
9 ☐ Other (Specify) ____

Total Facility Waste Amount

cubic feet ____

gallons 32,000 G

Total Facility Area

square feet 502,000 S 5 acr.

acres 22 A

Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☐ Suspected ☐ Likely ☒ None to the best of our knowledge.

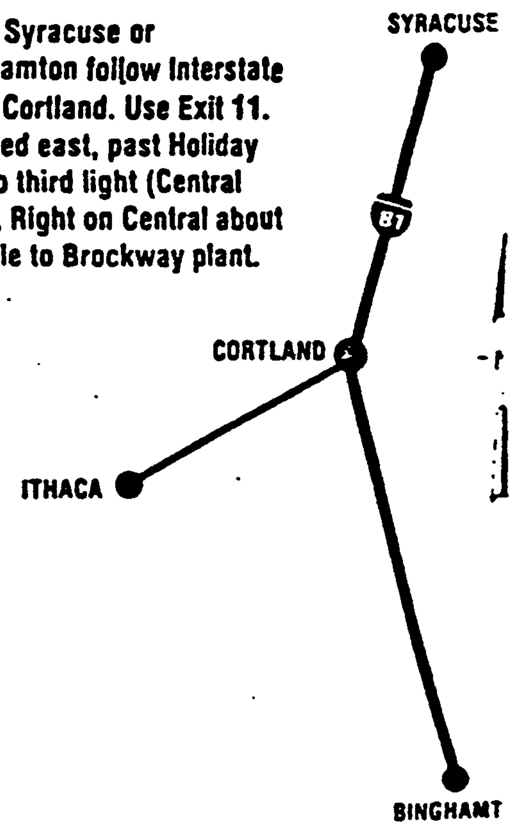
Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and assessing hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

SEE ATTACHED BUILDING LAYOUT
(DRAWING BB-00-00-02-G)

From Syracuse or Binghamton follow Interstate 81 to Cortland. Use Exit 11. Proceed east, past Holiday Inn, to third light (Central Ave.), Right on Central about ¼ mile to Brockway plant.



I Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

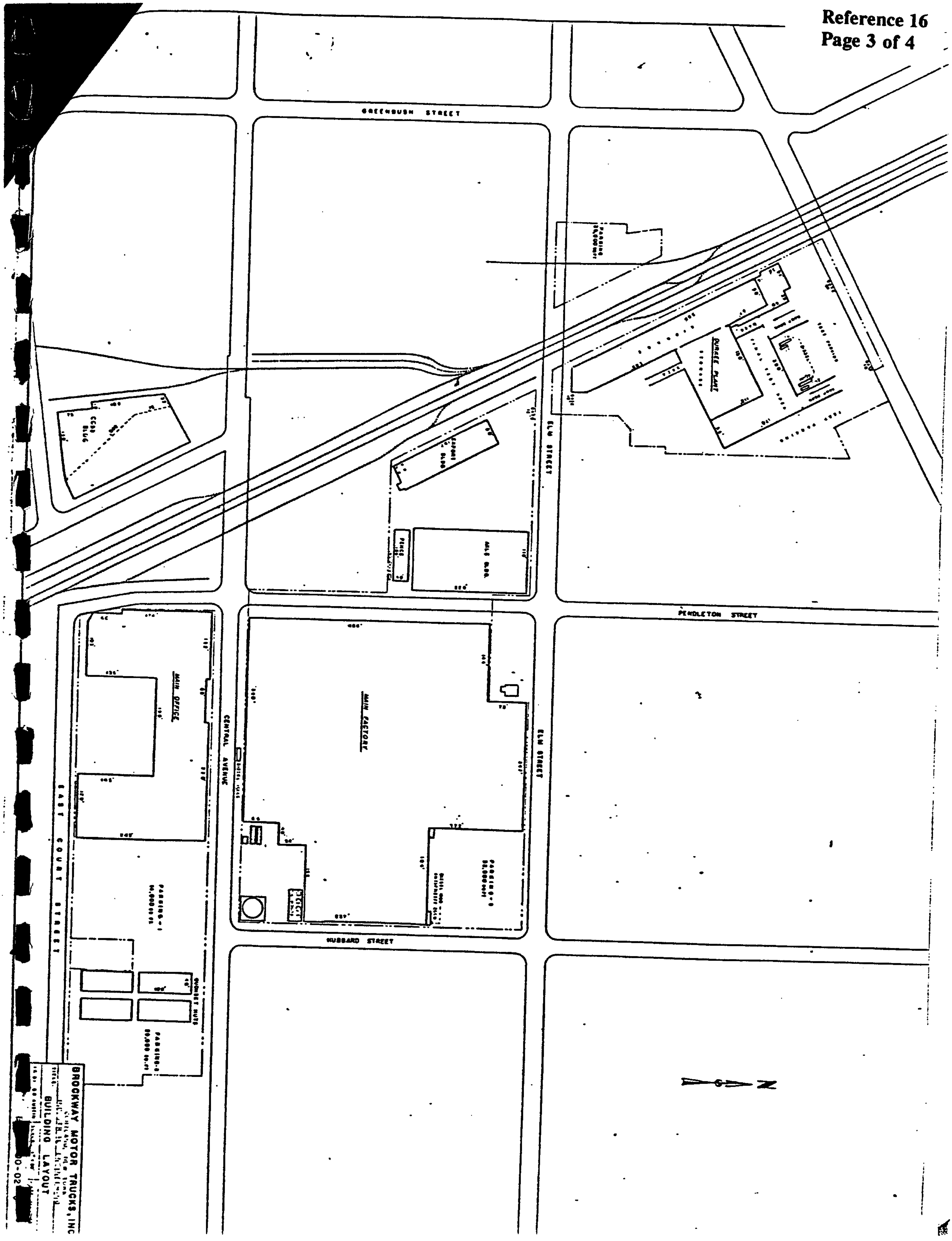
Industrial wastes were deposited from time to time on the site, which has since been covered by new construction.

J Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required ...

Name Kenneth A. Blythe, Staff Attorney
Mack Trucks, Inc.
Street 2100 Mack Boulevard, P. O. Box M
City Allentown, State PA Zip Code 18105
Signature Kenneth A Blythe Date June 8, 1981

☐ Owner, Present
☒ Owner, Past
☐ Transporter
☐ Operator, Present
☒ Operator, Past
☐ Other


GREENBUSH STREET
PENDLETON STREET
HUBBARD STREET
ELM STREET
CENTRAL AVENUE
EAST COURT STREET
MAIN OFFICE
MAIN FACTORY
BROCKWAY MOTOR TRUCKS, INC
BUILDING LAYOUT

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH & WALNUT STREETS
PHILADELPHIA, PA. 19106

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA-335

U.S. MAIL

U.S. EPA Region 2
Sites Notification
New York, NY 1007

Reference 17

THOMSEN ASSOCIATES

December 11, 1986

Mr. William Lewis
Rubbermaid
106 Central Avenue
Cortland, NY 13045

Reference: Hydrocarbon Investigation

Dear Mr. Lewis:

This letter report presents the findings and conclusions from our hydrocarbon investigation at your facility in Cortland, New York. Our investigation was authorized on November 10, 1986 under P. O. No. 10277, pursuant to our proposals of October 27 and November 7, 1986. This report has been prepared for the exclusive use of Canford Manufacturing Corporation with specific application to your facility in Cortland, New York. Our work was performed using generally accepted hydrogeologic practices. No other warranty, expressed or implied, is made.

Project Background

A buried 1000 gallon tank was uncovered in September, 1986 during excavation for a dry well. After the tank was removed, samples of water and sludge in the pit were taken and analyzed for benzene, toluene and xylene. The results showed 49 ug/l benzene, <1 ug/l toluene and 1760 ug/l xylene in the water sample, and no detectable concentrations of benzene, toluene or xylene in the sludge sample (verbal communication, William Lewis, October 23, 1986). Based on these results, further analysis of the water sample was performed for volatile halogenated compounds (EPA 601) and hydrocarbon identification (DOH 310-13) (see Appendix C). No halogenated compounds were found. The laboratory tentatively identified the hydrocarbon as gasoline, but indicated the pattern did not match gasoline exactly. The laboratory also indicated the benzene previously reported was not present.

Geotechnical & Materials Engineering, Geologic & Environmental Geoscience Services

105 CORONA AVENUE, GROTON, NY 13073, 607-898-5881

THOMSEN ASSOCIATES

Based on these results, Rubbermaid was requested by the NYSDEC to install 3 monitoring wells, obtain water samples from the wells and determine the direction of ground water flow. This report presents the findings and conclusions from this investigation.

Methodology

Three wells were installed in the vicinity of the tank (removed before our investigation). The location of the wells is shown on Drawing No. 1, Appendix A. One well (B-1) was placed in a presumed upgradient location and two wells (B-2 and B-3) were placed in presumed downgradient locations. The borings for the wells were advanced using 4 inch diameter flush joint casing. Soil samples were taken during drilling using a split spoon sampler to investigate subsurface conditions. Continuous soil samples were taken from a depth of 4 to 5 feet to a depth of 14 to 16 feet (see boring logs, Appendix B for depth of soil samples). Continuous soil samples were taken in this interval to identify whether a reported confining clay unit was present.

Monitoring wells were installed in the borings using two inch diameter flush joint, threaded, PVC riser pipe and well screen. Clean silica sand was placed around the well screen and a seal of bentonite pellets was placed above the sand pack. The wells were finished by placing a locking cap on the well and cementing a curb box flush with the ground surface over the well. Well construction details are shown on the boring logs in Appendix B.

The wells were developed by surging and pumping the wells until the water was clear. Water samples were taken on November 25, 1986 by Empire-Thomsen and delivered to Galson Technical Services for analysis. Before taking each water sample, the wells were purged using a pump until the conductivity of the water stabilized (<10% change between measurements). Twenty gallons were purged from each well to reach a stabilized conductivity. Water samples were taken using a PVC bailer. All sampling equipment was washed with soap and water and rinsed with clean tap water and distilled water between wells. Clean tubing was used to purge each well. A blank was prepared following water sampling using tap water from the facility.

THOMSEN ASSOCIATES

The location and elevation of the wells were surveyed on November 25, 1986. Elevations were determined using differential levelling and referenced to an assumed elevation of 100.00 for the east corner of the doorway to the metal storage building (see Drawing No. 1 for benchmark location). The well locations were taped from the metal storage building. Water levels were also measured on November 25, 1986 to determine the direction of ground water flow.

Findings and Conclusions

The three borings encountered 3 to 5-1/2 feet of fill below the ground surface. In boring B-1 and B-3 an organic silt unit was found beneath the fill. In boring B-2 medium to fine sand was encountered below the fill. All three borings encountered gravel and sand between a depth of 6 to 6.5 feet and the bottom of the boring (22 to 26 feet). The water table in the three borings ranged from 9 feet below ground surface in B-1 to 8.5 feet below ground surface in B-2. The water table in the borings is within the sand and gravel aquifer.

The water levels in the wells were used to determine the direction of groundwater flow (see Drawing No. 1, Appendix A). The direction of groundwater flow is toward the east, southeast, which conforms to the regional direction of groundwater flow in the aquifer. Wells B-2 and B-3 are downgradient of the location of the removed tank while B-1 is upgradient of the removed tank.

No detectable hydrocarbons were found in the three well water samples (see Appendix C). Although hydrocarbons were found in the water directly below the tank when it was removed, hydrocarbons are not currently found in the aquifer downgradient of the tank location. The absence of hydrocarbons in the aquifer downgradient of the removed tank is probably the result of one or more of the following factors: 1) removal of the tank, 2) attenuation of hydrocarbons in the organic silt unit before the hydrocarbons reach the underlying aquifer (the silt unit was found in borings B-1 and B-3 and also observed below the tank), 3) attenuation of hydrocarbons in the sand and gravel aquifer due to high flow velocities in the aquifer.

THOMSEN ASSOCIATES

Mr. William Lewis
Rubbermaid
Page 4
December 11, 1986

Since no contamination was found in the wells, we do not think any further monitoring of the site is needed.

Respectfully submitted,

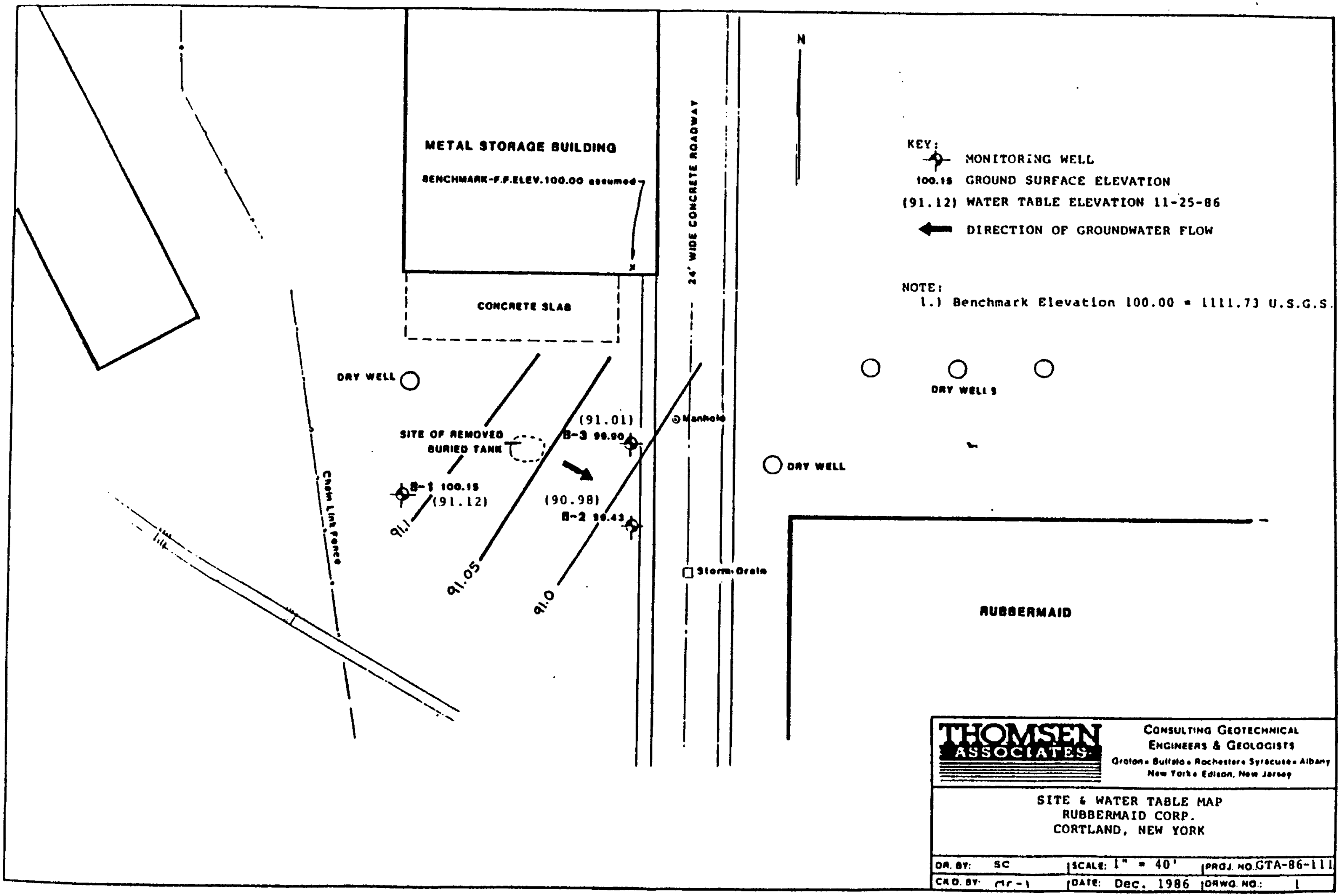
EMPIRE-THOMSEN

Marjory B. Rinaldo-Lee

Marjory Rinaldo-Lee, C.P.G.S.

MRL:er
cc: File

M10



Reference 17
Page 5 of 8

HYDROGEOLOGIC LOG

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM SMPL	RECOVERY (inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)
0			1		10	89	2" Crushed Stone; 8" Concrete				
							FILL: Brown/Grey SILT, SAND & GRAVEL w/Cinders (Moist) 5.5'				
			2		9	14	TOPSOIL (Organic Silt) 6.0'				
			3		14	39	Brown GRAVEL, little sand & silt (Wet-Compact)				
10			4		12	31					
			5		11	15	Firm				
			6		8	35					
20			7		5	36					
							Boring Terminated @ 22'				
30											

MONITOR/PIEZOMETER CONSTRUCTION DETAILS — Water Level 11-25

WATER PROBE READINGS — Temp (°C) | Cond (µmho cm) | Eh (mV) | pH

NOTES

WELL CONSTRUCTION

Screen: 2" Ø PVC, 0.002" slots, 15' long, 21.7'-6.7'

Riser: 2" Ø PVC, thraded, flush joints

Sand Filter: 4 Q silica Sand, 22'-6'

Bentonite Seal: 6'-4'

Metal curb box cemented over top of well flush with ground surface, locking cap installed on well

At completion of drilling, water 9.05', casing at 19.0'

Elevation at Top of Well=99.73

NOTE: See key and explanation to log.

RUN NO. | RECOVERY (Percent) | RQD

Surface Elevation 99.90
Date Started 11-24-86
Date Completed 11-24-86
Number of Installations in Boring 1
Method of Installation 4" dia. Flush Joint Casing

Project No. GTA-86-111
Project Title Rubbermaid Corporation
Location Cortland, New York
Classified By Hydrogeologist Checked Mr.-1

THOMSEN ASSOCIATES

MONITOR NO. B-3

Sheet 1 of 1

Reference 17
Page 6 of 8

HYDROGEOLOGIC LOG

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM SMPL	RECOVERY (inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)
0			1		24	42	FILL: Brown SAND & GRAVEL, Some Silt (Moist)				
							FILL: Black SILT & SAND, Some Gravel				
			2		12	17	Brown medium-fine SAND, Some Silt (Wet-Firm) 6.0'				
			3		2	18					
			4		4	26	Brown SAND & GRAVEL, Some Silt (Wet-Firm)				
10			5		6	26	Brown GRAVEL, Some Sand, little silt (Wet Firm to Compact)				
			6		6	31					
20			7		8	42	Brown SAND & GRAVEL, little silt (Wet-Compact)				
			8		7	57	Brown GRAVEL, Some Sand, trace silt (Wet-Very Compact)				
30							Boring Terminated @ 26'				

MONITOR/PIEZOMETER CONSTRUCTION DETAILS — Water Level 11-2?

WATER PROBE READINGS — Temp (°C) | Cond (Umho.cm) | Eh (mV) | pH

NOTES

WELL CONSTRUCTION

Screen: 2" Ø PVC, 0.002" slots, 20' long, 24'-4'

Riser: 2" Ø PVC, threaded flush joints

Sand Filter: 4 Q silica Sand, 24'-4'

Bentonite Seal: 4'-2'

Metal curb box cemented over well flush with ground surface, locking cap on well

At completion of drilling, water at 9.1', casing at 24.5'

Elevation Top of Well=99.21

NOTE: See key and explanation to log

RUN NO | RECOVERY (Percent) | RQD

Surface Elevation 99.43
Date Started 11-21-86
Date Completed 11-21-86
Number of Installations in Boring 1
Method of Installation 4" dia. Flush Joint Casing

Project No. GTA-85-111
Project Title Rubbermaid Corporation
Location Cortland, New York
Classified By Hydrogeologist Checked ___

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. B-2

Sheet 1 of 1

Reference 17
Page 7 of 8

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS — Water Level 11-25	WATER PROBE READINGS: Temp (°C)	Cond (µmho cm)	Eh (mV)	pH	NOTES
0			1		12	100/5	Fill: Grey GRAVEL & SAND, trace Silt (Dry)										WELL CONSTRUCTION Screen: 2" Ø PVC, .002" slots 15" Long. 22'-7' Riser: 2" Ø PVC, threaded flush joints
							4.5'										
5			2		17	12	Grey SILT & CLAY with organics, trace Sand (Moist-Medium) 6.5'										
			3		9	18	Brown SAND, Some Gravel & Silt										Sand Filter: 4 Q silica Sand 23.5'-6.5'
			4		7	19	(Wet-Firm)										
							Brown GRAVEL, Some Sand, little silt										
10			5		NR	19	(Wet-Firm)										Benonite Seal: 6.5'-4.5'
			6		9	52											Metal Curb Box cemented over well flush with ground surface, locking cap installed on well
15			7		8	24											
20			8														
			9														At completion of drilling, water at 9.8', casing at 22.0'
25							Boring Terminated @ 23.5'										Elevation Top of Well=99.89
30																	

NOTE: See key and explanation to log.

RUN NO.		RECOVERY (Percent)	ROD

Surface Elevation 100.15
Date Started 11-20-86
Date Completed 11-21-86
Number of Installations in Boring 1
Method of Installation 4" dia. Flush Joint Casing

Project No GTA-86-111
Project Title Rubbermaid Corporation
Location Cortland, New York

Classified By Hydrogeologist Checked [illegible]

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR [illegible]

Sheet 1 of [illegible]

Reference 18

RTMENT OF COMMERCE
ODGES, Secretary

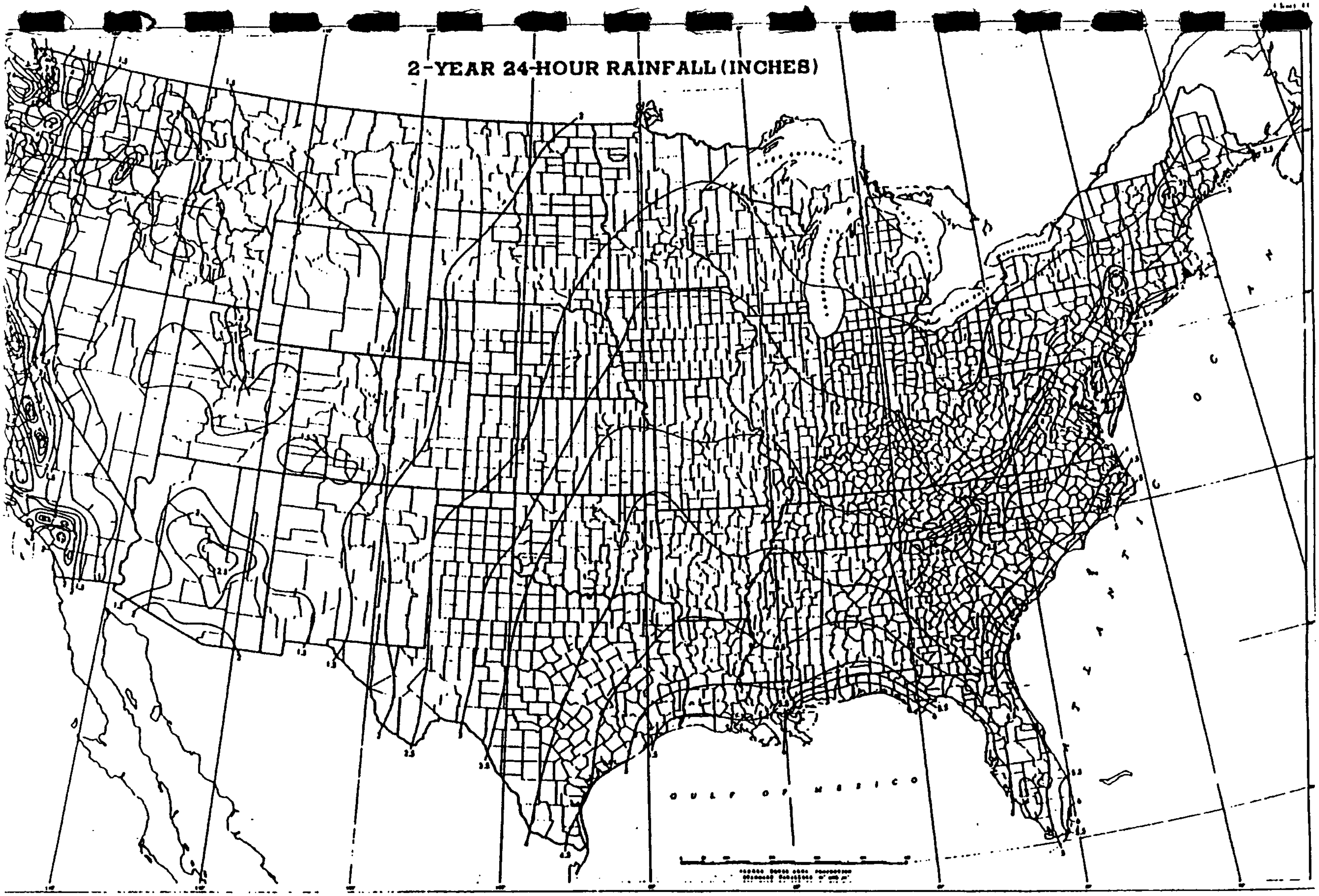
WEATHE
F. W. Reich

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture


2-YEAR 24-HOUR RAINFALL (INCHES)
GULF OF MEXICO

Reference 19

Series 1957, No. 10

Issued May 19[illegible]

SOIL SURVEY

Cortland County New York

OUR SOIL ★ OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION

Reference 19
Page 2 of 3

(Joins sheet 17)

(Joins sheet 27)

½
1 Mile
0

Palmyra Series

These medium-textured soils have an accumulation of clay beginning at depths between 12 and 18 inches. Even though the surface soil is medium to slightly acid, free lime commonly begins at depths between 26 and 40 inches. The soils are mainly on nearly level to gently sloping outwash plains in the valleys north of the city of Cortland and near Cuyler. They have formed in deep, gravelly outwash derived from siltstone, sandstone, shale, and dark-gray limestone. Because the underlying outwash material is moderately to rapidly permeable to water, the soils are well drained.

The Palmyra soils belong to the Gray-Brown Podzolic great soil group. Most commonly they are associated with moderately well drained Phelps and poorly drained Homer soils.

Typical profile (Palmyra gravelly silt loam, 0 to 3 percent slopes; cultivated):

A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; weak, fine to medium, crumb structure; friable; fine roots abundant; pH 6.6, limed; abrupt, smooth lower boundary.

A_2 8 to 12 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/4) gravelly silt loam; compound structure—weak, fine, crumb and very weak, thin, platy; friable; fine roots abundant; pH 5.7; 2 to 5 inches thick; clear, smooth lower boundary.

B_{21} 12 to 18 inches, dark-brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) gravelly silt loam; weak, fine, blocky structure; friable, slightly hard; fine to medium-sized roots plentiful; pH 6.4; 5 to 12 inches thick; clear, wavy lower boundary.

B_{22} 18 to 29 inches, dark-brown (10YR 4/3) to very dark grayish-brown (10YR 3/2) gravelly clay loam with many very dark gray (N 3/) and dark reddish-brown (5YR 3/2) pebbles of weathered limestone; weak to moderate, fine, subangular blocky structure; friable when moist, slightly sticky when wet, slightly hard when dry; firmer in place than horizons just above or below; a few medium-sized to large roots; contains a few cobblestones and other stones; pH 6.8; 8 to 18 inches thick; clear, irregular lower boundary.

C_1 29 to 40 inches, dark grayish-brown (10YR 4/2) very gravelly loam or sandy loam that has fewer pebbles of weathered limestone than material in the horizon just above; essentially structureless; loose; a few large and medium-sized roots; weakly calcareous; cobblestones and other stones are common, and many of them have a thin coating of carbonates: 8 to 20 inches thick; gradual. wavy lower boundary.

C_2 40 to 60 inches +, dark grayish-brown (10YR 4/2) gravelly, cobbly, and stony loam to sandy loam outwash material; structureless; loose; a few large roots; calcareous.

In some places near Preble, carbonates are at a depth of only 16 inches in these soils. They begin at depths of as much as 40 inches in places near Cortland where the Palmyra soils grade to the Howard soils. The thickness of the clayey B_{22} horizon varies: In many places tonguelike projections extend downward from the B_{22} horizon into the C_1 horizon; in other places, just a few feet away, the B_{22} horizon begins a little below the plow (A_p) layer. In places the C_2 horizon is several feet thick.

These soils are permeable to air and water, and roots penetrate easily. The gravelly silt loams do not contain enough gravel to interfere seriously with cultivation. The cobbly loam, however, contains enough cobblestones to make cultivation difficult.

These are among the most productive and highly responsive soils in the county. They have medium texture and a high content of lime. When fertilized with potash and phosphate, all crops grown in the area are suitable. The crops most commonly grown are corn for silage and grain, oats, wheat, alfalfa, and grass-legume hay crops and pasture. A small acreage is used to grow potatoes, dry beans, snap beans, cabbage, and peas.

The outwash deposits in which these soils formed are an important source of gravel for highway and building construction. Because the gravelly outwash is permeable to water, these soils are excellent sites for industrial development.

Palmyra gravelly silt loam, 0 to 3 percent slopes (PbA).—A profile of this soil is described as typical of the series. A few acres of gravel-free silt loam were included in mapping. The soil that is free of gravel is more acid at depths between 26 and 30 inches than the typical soil. Most of it is in an area 1½ miles northeast of Preble. Included with this soil are a few acres near Homer where the surface layer consists of gravelly sandy loam.

Palmyra gravelly silt loam, 0 to 3 percent slopes, is high in lime, has good moisture-holding capacity, and is easy to work. The soil absorbs water readily, and erosion is not a problem.

This soil is suited to intensive cultivation. It can be used for all of the crops commonly grown in the county, and yields are high. For continuous high yields, the supply of available forms of nitrogen, phosphorus, and potassium should be supplemented to the extent necessary. This soil is in capability unit I–1.

Palmyra gravelly silt loam, 3 to 8 percent slopes (PbB).—This soil has a profile like that of the soil described as typical of the series, but it has stronger slopes. In a small acreage the relief is undulating and the slopes are short and broken. Included with this soil are a few acres near Homer where the surface layer consists of gravelly sandy loam.

This productive soil is high in lime, absorbs water readily, and is easy to work. It is well suited to intensive cultivation and can be used for all the crops commonly grown in the county. The soil requires about the same general management as the less strongly sloping Palmyra soils. If used for continuous row crops, however, it needs protection from erosion. This soil is in capability unit IIe–1.

Palmyra gravelly silt loam, 8 to 15 percent slopes (PbC).—This soil resembles the soil described for the series, but most of it has short, steep slopes that are complex. In a small acreage it has simple slopes.

Runoff is rapid and the soil is somewhat droughty. The soil is more likely to erode than the less strongly sloping Palmyra soils and is not so easy to work. Nevertheless, it is productive and can be used for all the crops commonly grown in the county. Long-lived varieties of alfalfa, mixed with smooth bromegrass and grown for hay, are especially well suited to this Palmyra soil because of the ability of the alfalfa to extract moisture from depths of 3 to 4 feet in the soil profile. This soil is in capability unit IIIe–1.

Palmyra gravelly silt loam, 15 to 25 percent slopes (PbD).—This soil has a profile similar to that of the soil described as typical of the series. In general, however, the depth to the clayey horizon (B_{22} horizon in the typi-

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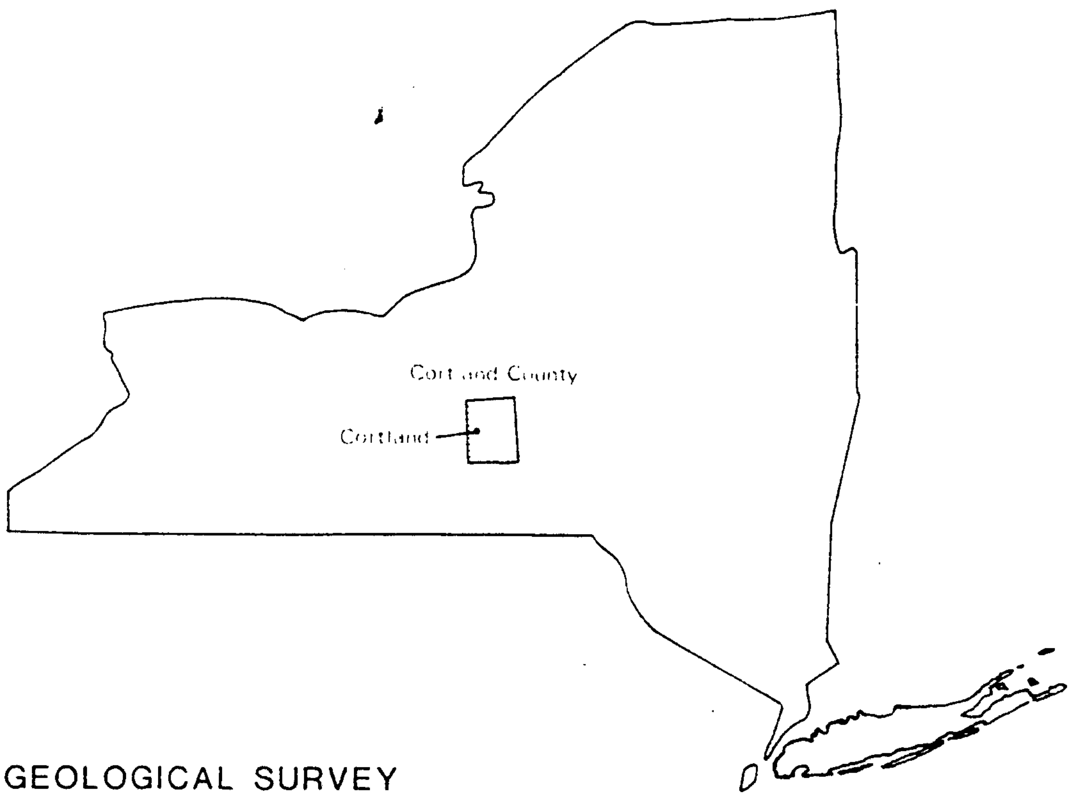
Hydrogeology of the Surficial Outwash Aquifer at Cortland, Cortland County, New York



U.S. GEOLOGICAL SURVEY
Water-Resources Investigations
Report 85-4090

Prepared in cooperation with
SUSQUEHANNA RIVER BASIN COMMISSION

HYDROGEOLOGY OF THE SURFICIAL OUTWASH AQUIFER AT CORTLAND, CORTLAND COUNTY, NEW YORK

By Richard J. Reynolds

U.S. GEOLOGICAL SURVEY

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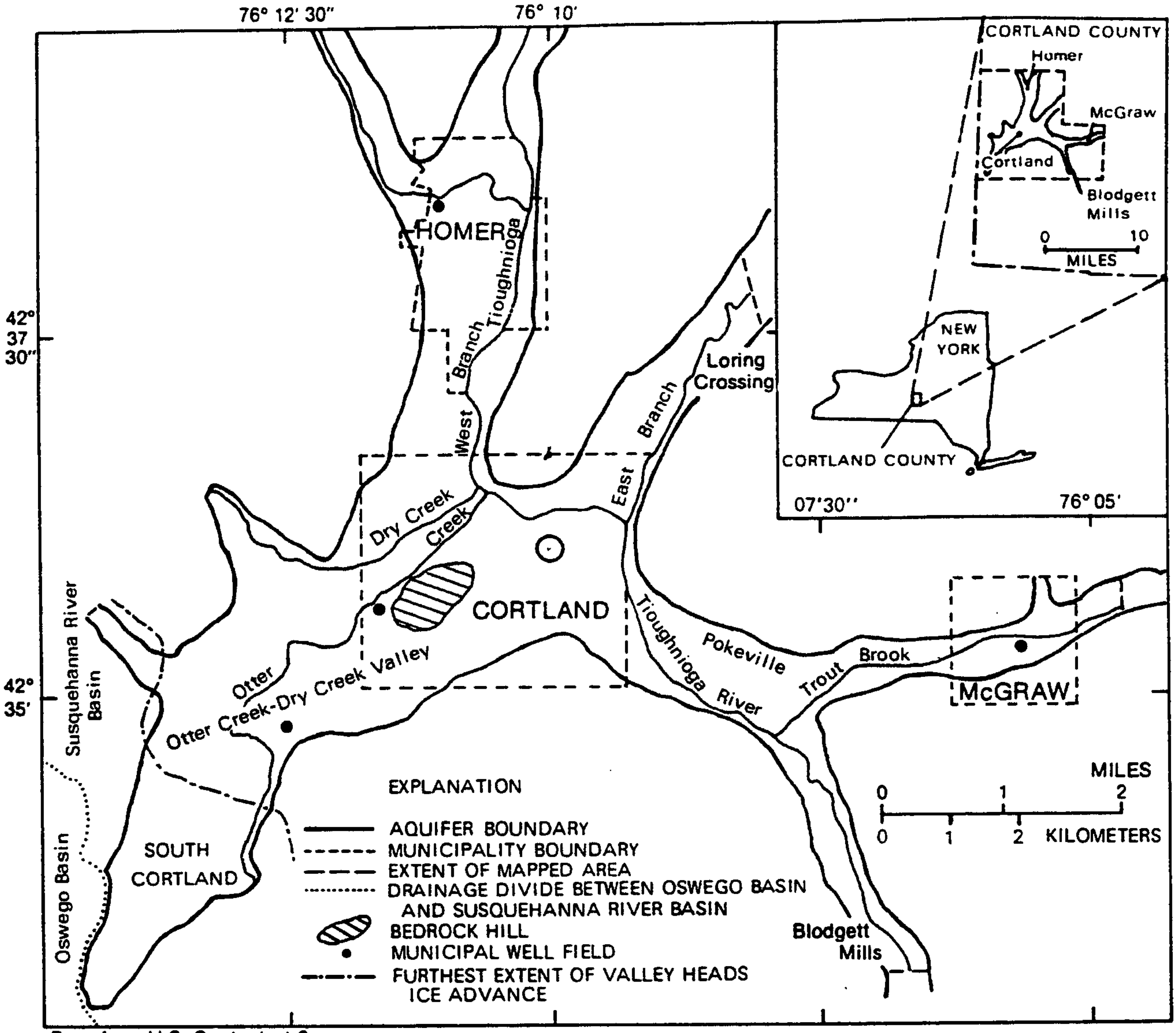
Albany, New York

1987



Base from U.S. Geological Survey
1:24000 series: Cortland (1955),
Homer (1978), Groton (1976), McGraw (1979).

Figure 1.—Location and major geographic features of the study area.

GEOLOGY OF THE CORTLAND AQUIFER SYSTEM

Geologic investigations were conducted from 1979 to 1981 to define the hydrogeologic framework of the valley sections to be added to the Otter Creek-Dry Creek model developed by Cosner and Harsh (1978). This work consisted of a well inventory, a review of drillers' logs, drilling several test holes, and installing several observation wells. (Selected well and test-hole logs are presented in appendix I.) These and other logs were used to construct geologic sections of the area and to aid in developing several of the input data matrices for the model. In addition, a seepage investigation over a 2.84-mile reach of the Tioughnioga River was conducted to evaluate ground-water discharge from the surficial outwash aquifer.

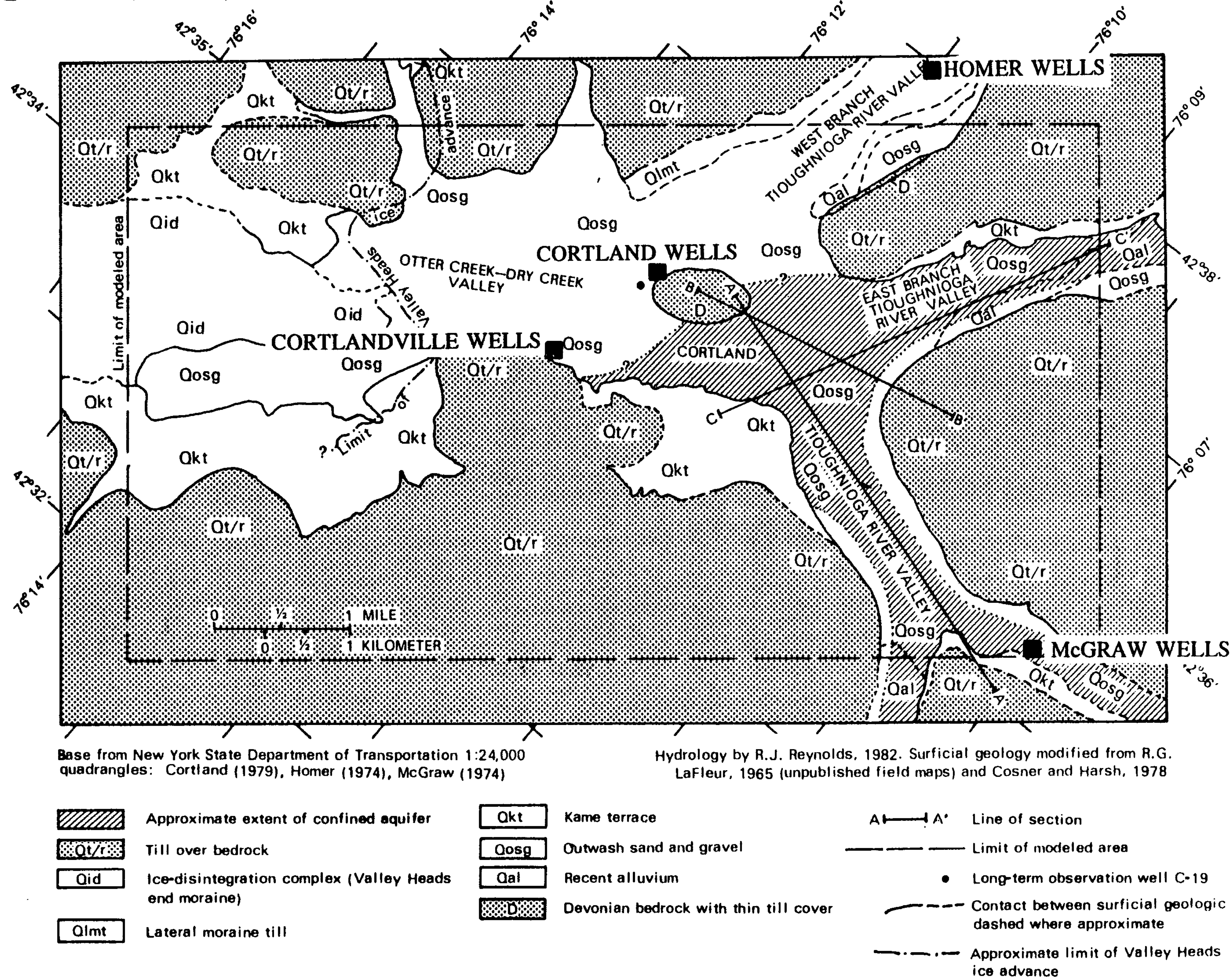


Figure 2.--Generalized surficial geology and extent of confined aquifer in the Cortland area.

The aquifer of primary interest in the Cortland area is a thick outwash deposit that extends from the Valley Heads end moraine, southwest of Cortland (fig. 2), northeastward throughout the city of Cortland and into the adjacent Tioughnioga River valley (Buller and others, 1978; Cosner and Harsh, 1978). The surficial outwash aquifer is of interest because of its hydraulic connection to small streams that cross it and to major rivers that border it. This outwash deposit is flanked in places by kame terraces composed of ice-contact stratified sand, gravel, silt, and clay; locally it contains discontinuous interbedded lenses of fine-grained silt and clay. The outwash becomes more silty and clayey southwestward and gradually grades into the Valley Heads moraine southwest of Cortland (fig. 2; pl. 1).

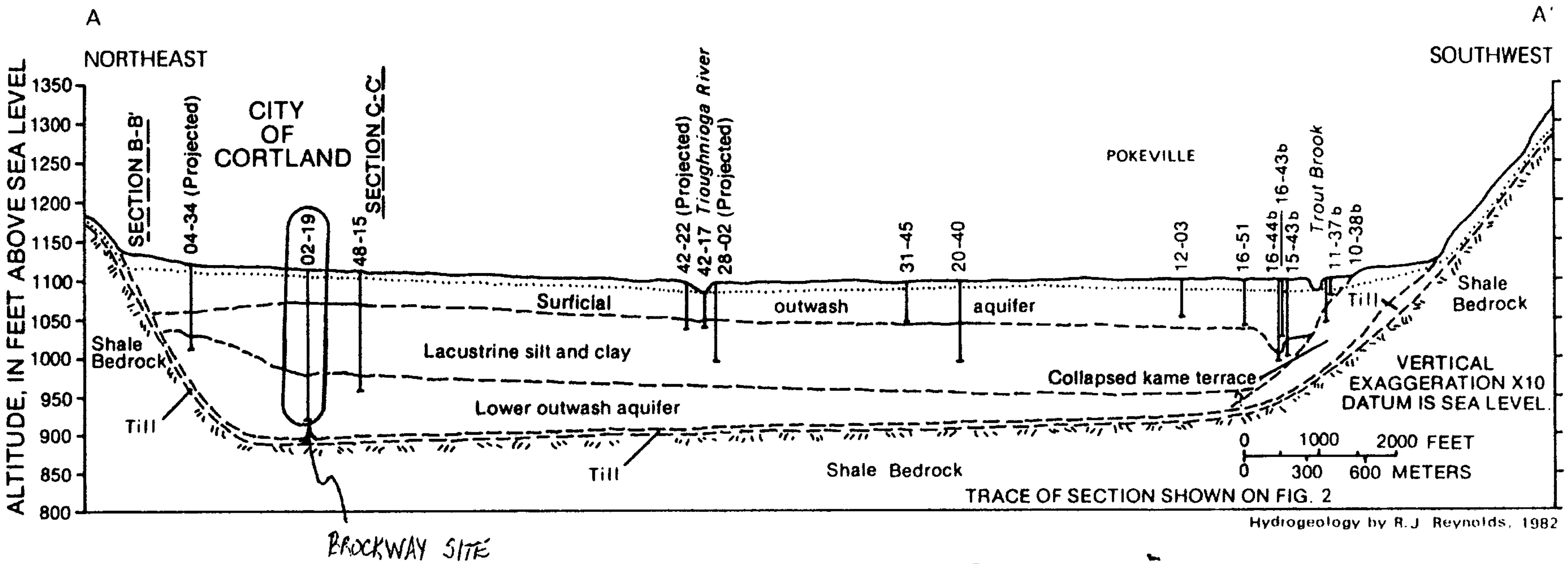
The Valley Heads moraine is an ice-disintegration complex of till and interbedded discontinuous lenses of gravel and sand (Cosner and Harsh, 1978). Surrounding this valley system are till-mantled bedrock hills that rise to a maximum of 700 ft above the valley floor. Within the city of Cortland, a bedrock hill protrudes above the valley floor and partly isolates the Otter Creek-Dry Creek outwash aquifer from the adjacent Tioughnioga River.

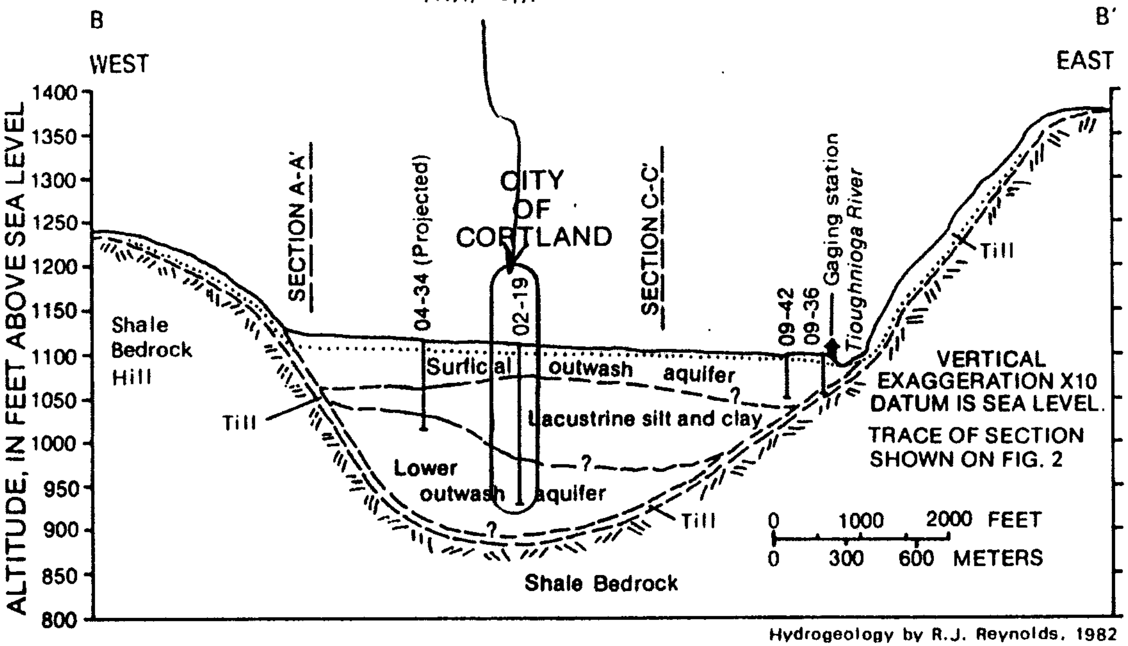
Well-completion data (Randall, 1972) and new test-hole data (appendix I, pl. 1) confirm the presence of a thick sequence of lacustrine silts and clays in the Tioughnioga River valley extending from Cortland southeast down the river valley and northeastward up the East Branch (fig. 2). This lacustrine unit, which pinches out a short distance southwest (upvalley) of Cortland in the Otter Creek-Dry Creek basin, separates the surficial outwash aquifer from a confined, deeper sand and gravel aquifer (fig. 2) in these valley limbs. The relative position of these units is shown in cross section in figure 3.

Surficial Outwash Aquifer

The surficial outwash aquifer is hydraulically connected to the overlying East Branch, West Branch, and Tioughnioga Rivers. Because of this connection, pumping from this aquifer at some locations could induce infiltration from these rivers in addition to capturing ground water that would normally enter them; thus possibly reducing flow in the river to unacceptable levels during annual low-flow periods.

In the East Branch and Tioughnioga River valleys, the outwash forms a water-table aquifer consisting of variably silty sand and gravel. In the Tioughnioga River valley between Cortland and Pokeville, the saturated thickness of the aquifer generally ranges from 30 to 50 ft (fig. 3A). Near Trout Brook, southeast of Pokeville, the saturated thickness increases to approximately 80 ft where the lacustrine unit beneath it pinches out and the surficial aquifer merges with the sand and gravel of a collapsed kame terrace (fig. 3A). In the East Branch Tioughnioga River valley (fig. 3C), the surficial aquifer thins from a maximum saturated thickness of 50 ft at Cortland to about 25 ft at Loring Crossing.





EXPLANATION

APPROXIMATE AVERAGE ANNUAL WATER TABLE

GEOLOGIC CONTACT-- Dashed where inferred

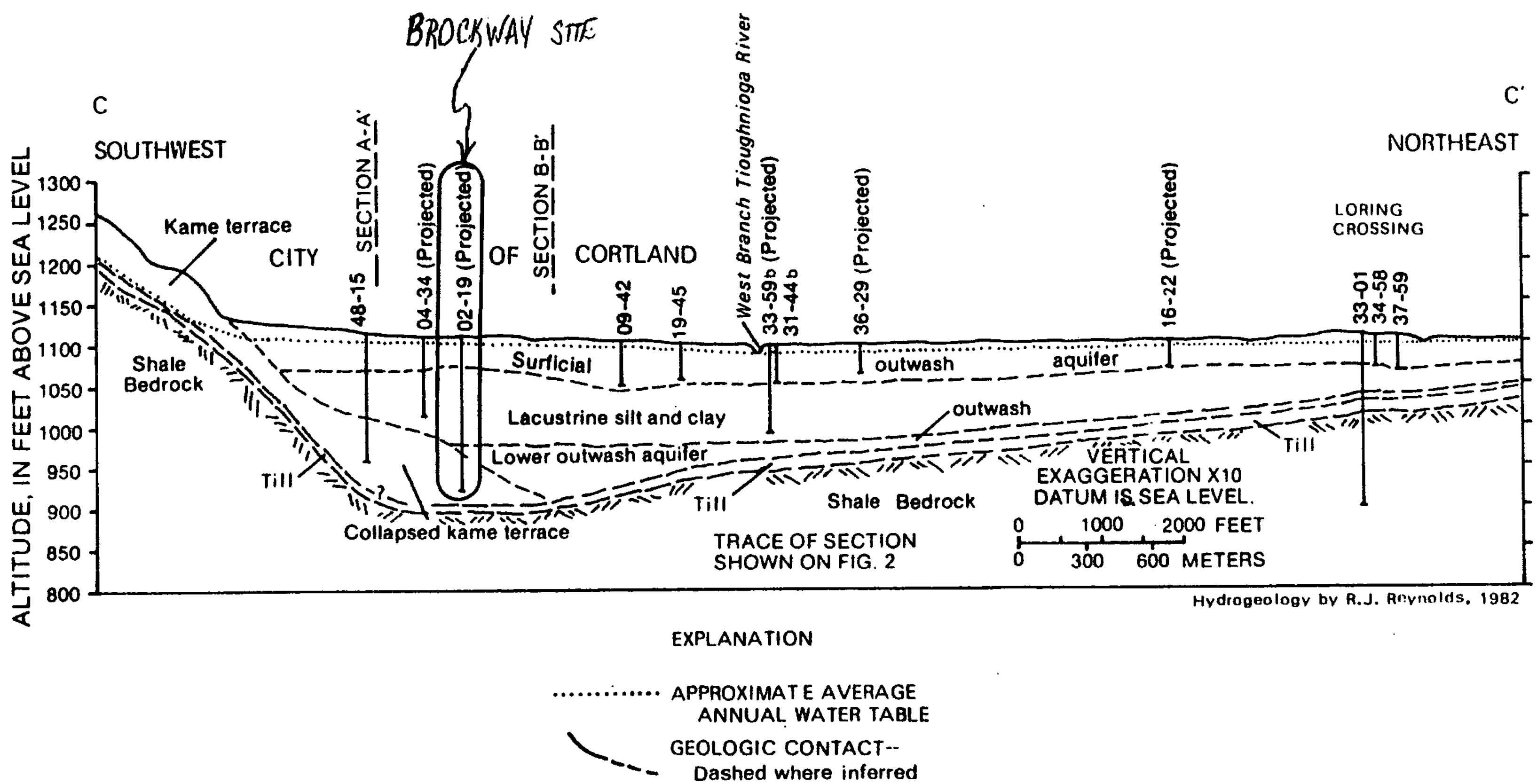


Figure 3.--Geologic sections: A-A', from Cortland to Pokeville along the Tioughnioga River valley near Cortland; B-B', across the Tioughnioga River valley at Cortland; C-C', along the East Branch Tioughnioga River valley from Cortland to Loring Crossing. (Trace of sections is shown on pl. 1 and fig. 2.)

Kame Terraces

Kame terraces are ice-contact, glaciofluvial deposits of stratified sand and gravel with interbedded layers of silt and clay that were deposited by meltwater streams flowing in channels between the glacier and the valley walls. Material was often deposited atop or against the ice bordering these channels, so that when the ice melted, the deposits formed flat-topped, irregularly shaped terraces with components spreading outward into the valley. The two kame terraces that flank the Otter Creek-Dry Creek valley on its southern and northern edges (fig. 2, pl. 1) are hydrogeologically significant because they provide avenues for additional recharge to the outwash aquifer. The buried, collapsed edges of these kame terraces commonly extend downward under the surficial outwash and toward the valley center and may merge with or directly overlie previously deposited outwash. In areas where this collapsed kamic material and outwash is overlain by lacustrine deposits, together they form a confined aquifer that extends into the Tioughnioga River valley (fig. 2). This confined aquifer lies within the eastern part of the Otter Creek-Dry Creek valley and extends from the bedrock hill within the city of Cortland eastward into the Tioughnioga and East Branch Tioughnioga River valleys (fig. 2).

Lacustrine Unit

Lacustrine sediments, which consist of interbedded fine sand, silt, and clay, were deposited in proglacial lakes that developed between older sediment deposits downvalley and the retreating ice front in the Otter Creek-Dry Creek and Tioughnioga River valleys. Meltwater streams carrying a mixture of gravel, silt, and clay under high velocity deposited the coarser fraction of their sediment loads at the edge of these proglacial lakes to form kame deltas, while the lighter fraction, mostly silt and clay, was carried further into the lake, where it gradually settled out to form thick lacustrine units.

Geologic data show that the silt and clay lacustrine unit, which overlies a confined sand and gravel aquifer throughout the East Branch Tioughnioga and Tioughnioga River valleys (fig. 2), is thickest in the Cortland vicinity and thins slightly southeastward toward Pokeville. Section A-A' (fig. 3A) shows the lacustrine unit to be approximately 95 ft thick at the city of Cortland and approximately 80 ft thick near Pokeville. The thickness of the lacustrine unit varies considerably and corresponds to changes in altitude of the underlying kame terrace or outwash surface. The silty clay unit is saturated throughout the study area, but its thickness and low hydraulic conductivity retard upward movement of ground water from the lower aquifer to the upper aquifer. The lacustrine unit thins out southwest of Cortland, as evidenced by the log for well 04-34 (appendix I and fig. 3B), which indicates only 35 ft of this unit.

The underlying aquifer within the city of Cortland probably consists of collapsed and buried material from the large kame terrace south of Cortland (fig. 3B) that extends toward the center of the valley near the southwest city boundary. This collapsed, buried kame terrace provided an elevated surface upon which the lacustrine unit was deposited and thus accounts for the smaller thickness of the lacustrine unit in this area.

The lacustrine unit thins rapidly northeastward from a maximum thickness of 95 ft at Cortland to about 35 ft at Loring Crossing as a result of the upward slope of the underlying units (fig. 3C). Figure 2 shows the approximate areal extent (at depth) of the lacustrine unit and underlying confined aquifer within the valleys.

Confined Outwash Aquifer

Beneath the lacustrine unit in the East Branch Tioughnioga and Tioughnioga River valleys (fig. 2) is a confined sand and gravel aquifer of highly variable thickness that is probably older outwash. Its variable thickness is due, in part, to erosion of its upper surface and its merging with collapsed kame-terrace deposits in some areas; its thickness also reflects the altitude of the underlying till and bedrock surfaces. South of the city of Cortland (fig. 3C), this unit merges with collapsed kame-terrace material to form the thickest confined section, estimated to be approximately 75 ft thick. From Cortland northeast to Loring Crossing (fig. 3C), this buried aquifer thins to less than 10 ft thick as a result of the upward slope of the underlying bedrock surface and probably pinches out farther north in the valley. Geologic data on the thickness of this unit in the Tioughnioga River valley (fig. 3A) southeast of Cortland, although scant, suggest that the unit may thin from 75 ft at Cortland to about 30 ft at Pokeville.

Bedrock and Till

Bedrock in the study area consists of shale units of the Upper Devonian Genesee Group (Rickard and Fisher, 1970). The bedrock configuration (Cosner and Harsh, 1978) is representative of a preglacial drainage network, but its surface configuration is not well known. Depth to bedrock in the area ranges from land surface to more than 200 ft. Where shale is exposed at land surface it is weathered and jointed, but the number and size of openings decrease with depth (Cosner and Harsh, 1978). The joints and bedding planes, which form only a small fraction of the total bedrock volume, are the only significant void space in which water can be stored and transmitted. Thus, shale bedrock in this area is a relatively low-yielding source of water and is used only for farm and domestic supplies.

Till in this area is a poorly sorted mixture of silty clay with varying amounts of sand, gravel, and boulders. A veneer of till directly overlies shale bedrock in the uplands surrounding the study area, where it may range in thickness from 2 to 20 ft. Till is also assumed to overlie bedrock in parts of the valley (figs. 3A, 3B, 3C), but test-hole data are insufficient to confirm this. Till in this region generally has a low hydraulic conductivity and therefore does not transmit or yield water readily. However, sufficient domestic supplies can usually be obtained from shallow, large-diameter dug wells excavated in till. Because of this low permeability, most of the precipitation falling on till in upland areas does not infiltrate but is routed to streams as runoff. However, some recharge does occur in areas of upland till, principally during the winter months, and provides base flow to the small streams that drain these areas (Cosner and Harsh, 1978).

HYDROLOGY OF THE CORTLAND AQUIFER SYSTEM

The valley configuration at Cortland represents a hydrologic situation that is uncommon in New York, in that the aquifers in the Otter Creek-Dry Creek valley are, to a large extent, hydraulically separated from the adjacent Tioughnioga River.

Most of the productive valley aquifers within the Susquehanna River basin and elsewhere in upstate New York are parallel to and have a direct hydraulic connection with streams or rivers that cross or border them, so that heavy pumping from the aquifers, even for relatively short periods, normally reduces adjacent streamflow by induced infiltration. The Otter Creek-Dry Creek outwash aquifer, however, is partly separated from the West Branch Tioughnioga River and Tioughnioga River by a bedrock hill in the center of the valley that serves to disrupt the ground-water flow field between the municipal pumping centers and the river. In addition, the distances from the bordering rivers to the municipal well fields are large enough to ensure that induced infiltration from the rivers would not readily take place. Moreover, the difference between the average altitude of the water table at the Cortland municipal well fields and the average river stage would seem to reduce the likelihood of causing induced infiltration under normal circumstances.

Another type of separated aquifer, a confined outwash aquifer, lies beneath the thick deposits of lacustrine clay and silt within the city of Cortland and in the East Branch Tioughnioga and Tioughnioga River valleys. Confined valley aquifers such as this are hydraulically separated from the overlying rivers by thick lacustrine units, which generally have a very low hydraulic conductivity. Pumping from the confined aquifer in the Cortland area, therefore, would not readily induce infiltration from the Tioughnioga River because the lacustrine unit would inhibit any downward leakage.

System Boundaries

The aquifer system at Cortland consists of variable lithologic units that form a surficial outwash aquifer and a confined outwash aquifer. The study area comprises the Otter Creek-Dry Creek basin and parts of the East Branch, West Branch, and Tioughnioga River valleys.

The aquifer system in the Cortland area is bounded on the southwest by the Valley Heads terminal moraine, which forms the surface-water and ground-water divide between the Oswego drainage basin and the Susquehanna River basin (fig. 1). The Tioughnioga River, on the east and southeast side of Cortland, is the discharge point for much of the ground water moving through the aquifer system. The bedrock valley walls flanking the Otter Creek-Dry Creek basin and the Tioughnioga River are treated as impermeable boundaries because shale bedrock generally transmits little water; in other words, the amount of ground water seeping from the bedrock to the aquifer is negligible compared to the amount contributed by direct precipitation and adjacent stratified drift.

The lacustrine unit in the eastern part of the Otter Creek-Dry Creek basin and in the Tioughnioga River valley (figs. 3A, 3B, 3C) overlying the confined outwash aquifer (fig. 2) acts as a confining unit and produces artesian conditions in the underlying aquifer.

Recharge

The aquifer system at Cortland is recharged primarily through infiltration of precipitation, although some recharge occurs as leakage from streams, as ground-water flow from flanking kame-terrace deposits, and from runoff from adjacent bedrock hills. Rates of recharge to stratified-drift aquifers such as these vary seasonally and areally and must be estimated because they cannot be measured directly. Randall and others (1966) show that average annual recharge to stratified drift may reach 1 (Mgal/d)/mi^2. Cosner and Harsh (1978) used a recharge rate of 28 in/yr, which equals approximately 1.25 (Mgal/d)/mi^2. Over a modeled area of 7.9 mi^2, this amounts to 9.89 Mgal/d of recharge. Although about 30 percent of the average annual precipitation (41 in.) falls during the growing season (Sealy and others, 1961), nearly all of it is lost through evapotranspiration, and only a small amount recharges the aquifer (MacNish and others, 1969).

Surficial aquifer

The surficial aquifer is recharged primarily by precipitation and by streambed leakage over losing reaches of small streams in the Otter Creek-Dry Creek basin and probably elsewhere in the valleys. Recharge from Otter Creek and Dry Creek occurs along the stream channels where they traverse the valley floor, from the point where the streams leave the till-covered bedrock uplands to their confluence with the West Branch Tioughnioga River (Cosner and Harsh, 1978; Buller and others, 1978).

Additional recharge to the surficial aquifer also occurs through the kame terraces that flank the north and south edges of the Otter Creek-Dry Creek basin (fig. 2). These kame terraces are hydraulically connected to both the surficial and confined aquifers, and precipitation on these kame terraces therefore recharges both the upper and lower outwash aquifers.

Confined aquifer

The confined outwash aquifer, which underlies the eastern end of the Otter Creek-Dry Creek basin and extends throughout the Tioughnioga River valley, is recharged wherever it is hydraulically connected with the upper aquifer--that is, wherever the intervening lacustrine unit is absent. The recharge area for the confined aquifer is assumed to be west of the bedrock hill in the western part of the Otter Creek-Dry Creek basin (fig. 2) because the lacustrine unit in this area pinches out, thus allowing good hydraulic connection between the two aquifers through which recharge can occur. Additional recharge to the confined aquifer occurs where the aquifer is hydraulically connected to kame terraces at the valley sides, such as near the south side of Cortland and near Pokeville (figs. 2, 3A, 3C).

Ground-Water Movement

Information about directions of ground-water flow and seasonal water-table configurations was obtained from periodic water-level measurements in a network of observation wells within the Otter Creek-Dry Creek basin during

1976 (Cosner and Harsh, 1978). Additional information about general ground-water flow directions and water-table fluctuations in the extended-model area was obtained during 1980-81 from periodic water-level measurements in two observation wells and from historical water-level data. The 1976 water-level data and the 1980-81 data together provided the basis for a steady-state calibration of the enlarged model.

Ground-water movement in the surficial outwash aquifer within the Otter Creek-Dry Creek basin is generally northeastward (downvalley) toward the West Branch Tioughnioga and Tioughnioga Rivers and moves eastward, more perpendicular to the river, within the city of Cortland. Ground-water flow in the East Branch Tioughnioga River valley is predominantly eastward across the valley toward the East Branch Tioughnioga River, and flow in the Tioughnioga River valley between Cortland and Pokeville is westward across the valley toward the Tioughnoiga River. Along some valley walls that border the aquifer, such as southwest of Cortland, ground water from kame terraces flows into both the surficial aquifer and confined aquifer. General directions of ground-water flow in the surficial aquifer during spring conditions are shown on plate 2.

Historic water-level data on the lower outwash aquifer are scant; however, hydraulic heads in this aquifer are probably above the water table in most areas within the Tioughnioga valley and seasonally above land surface in the vicinity of Cortland. Records for well 48-15, drilled in 1944 for Brewer-Tichner Corp. (pl. 1, figs. 3A, 3C) and screened in the lower unit, indicate that the well flowed for approximately 1 month after completion (Randall, 1972). Because the principal recharge area for the confined aquifer is in the Otter Creek-Dry Creek basin, ground-water flow in this aquifer is probably northeastward from the recharge area toward the Tioughnioga River, then southeastward in the Tioughnioga River valley. The discharge area for ground water moving through the confined aquifer is assumed to be further south in the Tioughnioga River valley, beyond the study area.

STREAM-AQUIFER RELATIONSHIP

Several factors determine the rate of ground-water flow between the surficial aquifer and the overlying rivers or streams. The most important of these are (1) the head difference between the stream (or river) stage and the underlying aquifer, (2) the vertical hydraulic conductivity of the streambed material, (3) the hydraulic conductivity of the aquifer, (4) the depth of incision of the stream into the aquifer, and (5) the proximity of nearby impermeable boundaries, such as a bedrock wall, which may alter ground-water flow paths near the river.

In this study, an effort was made to evaluate the amount of ground-water seepage to the Tioughnioga River and to estimate the hydraulic conductivity of the streambed and the aquifer. This was done by measuring discharge at successive points along the Tioughnioga River near Cortland to determine areas of gains or losses of flow (generally known as a seepage investigation), combined with water-level measurements at nearby wells and augmented by analysis of specific-capacity data from a nearby industrial well screened in the surficial station during the seepage run. For expediency, it is assumed that this total head loss is measured across a streambed thickness of 1.5 ft, as used by Cosner and Harsh (1978). The vertical hydraulic conductivity of the streambed, based on measured seepage over stream reach B, was calculated to be 1.04 ft/d, which is comparable to the value of 1.9 ft/d reported by Haeni (1978) for the Pootatuck River in Connecticut but is two orders of magnitude greater than the value of 0.038 ft/d used by Cosner and Harsh (1978). The value selected by Cosner and Harsh was based solely on model calibration to achieve a desired total stream-leakage value for Otter and Dry Creeks. As such it is dependent on the accuracy of the estimates of other hydrologic variables used as model input.

Aquifer Characteristics

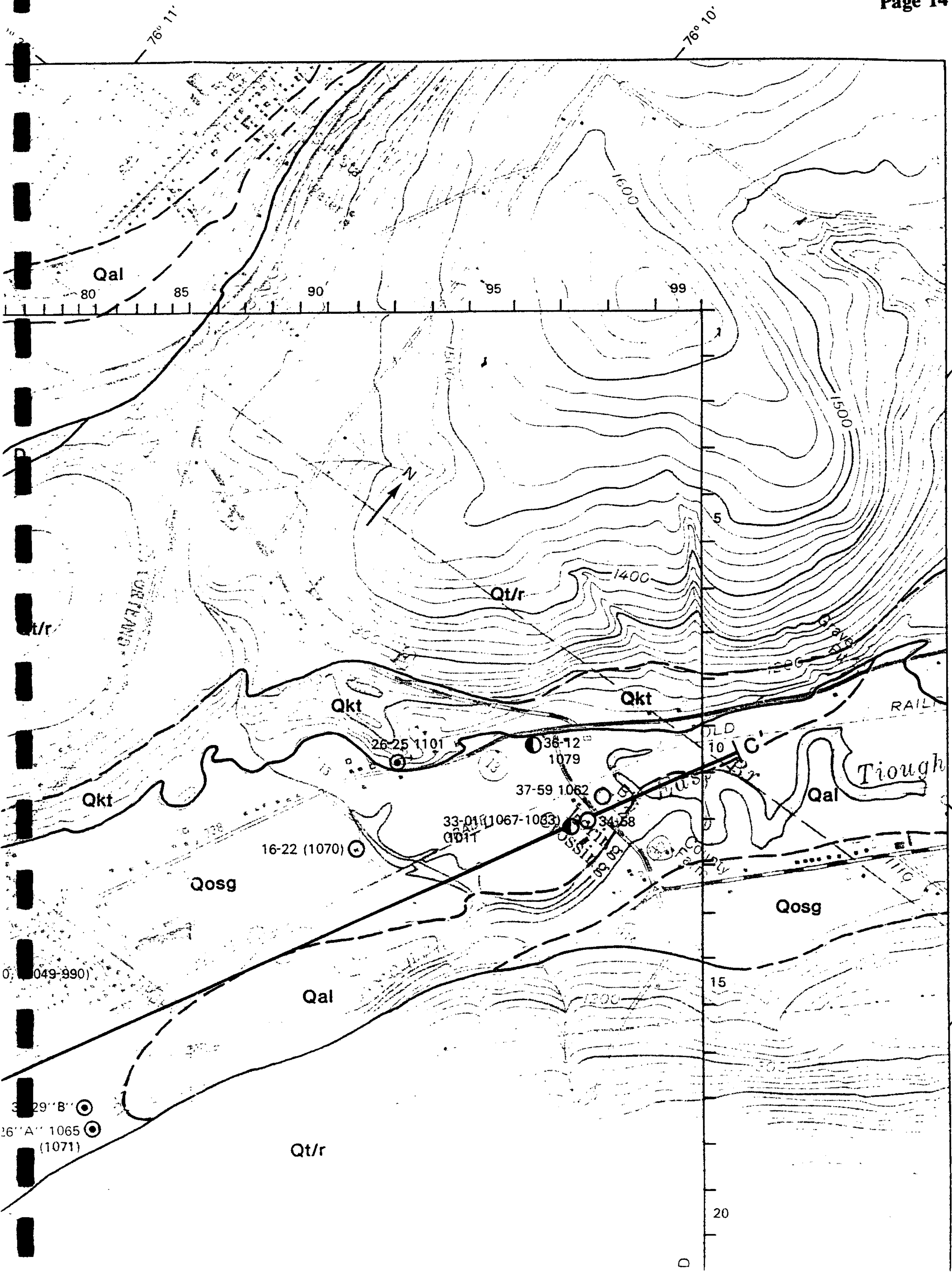
The surficial aquifer is highly permeable, with a hydraulic conductivity of 300 to 350 ft/d as estimated from specific-capacity data from an industrial well near Pokeville in the Tioughnioga River valley (appendix II). These values and the range in saturated thickness indicate that the transmissivity of the surficial aquifer in the Tioughnioga River valley ranges from approximately 7,500 to 28,000 ft/d. Most 6-inch-diameter domestic wells tapping this aquifer are finished open ended (with no well screen); therefore, reported yields are commonly less than 50 gal/min. However, properly screened and developed production wells tapping this unit could be expected to yield at least 500 gal/min (provided the saturated thickness is adequate), as evidenced by the high specific capacity of 44 (gal/min)/ft at a pumping rate of 350 gal/min at the 12-inch-diameter industrial well near Pokeville mentioned above.

The hydraulic-conductivity value obtained for the surficial aquifer in this area is substantially lower than those calculated from three wells tapping the same aquifer in the Otter Creek-Dry Creek valley. On the basis of three aquifer tests, Buller and others (1978) reported transmissivity in the Otter Creek-Dry Creek basin to range from 37,000 to 80,000 ft^2/d, with respective hydraulic-conductivity values ranging from 950 to 1,140 ft/d. These data indicate the surficial outwash aquifer to be somewhat less permeable in the Tioughnioga River valley than in the Otter Creek-Dry Creek basin.

SIMULATION OF GROUND-WATER FLOW

Model Description

A finite-difference ground-water flow model developed by Trescott and others (1976) was used to simulate the response of the surficial outwash aquifer to imposed stresses. The model simulates two-dimensional ground-water flow in response to artifically imposed stresses such as pumping or to naturally occurring stresses such as drought. Given specific values for aquifer characteristics such as hydraulic conductivity and specific yield, the model can be used to simulate water levels that would result under both steady-state (no change in heads with time) and transient-state hydrologic conditions and to calculate changes in water levels that would result from pumping at specific sites. Sources of water may include aquifer stoiage, recharge from precipitation, inflow across aquifer boundaries, and induced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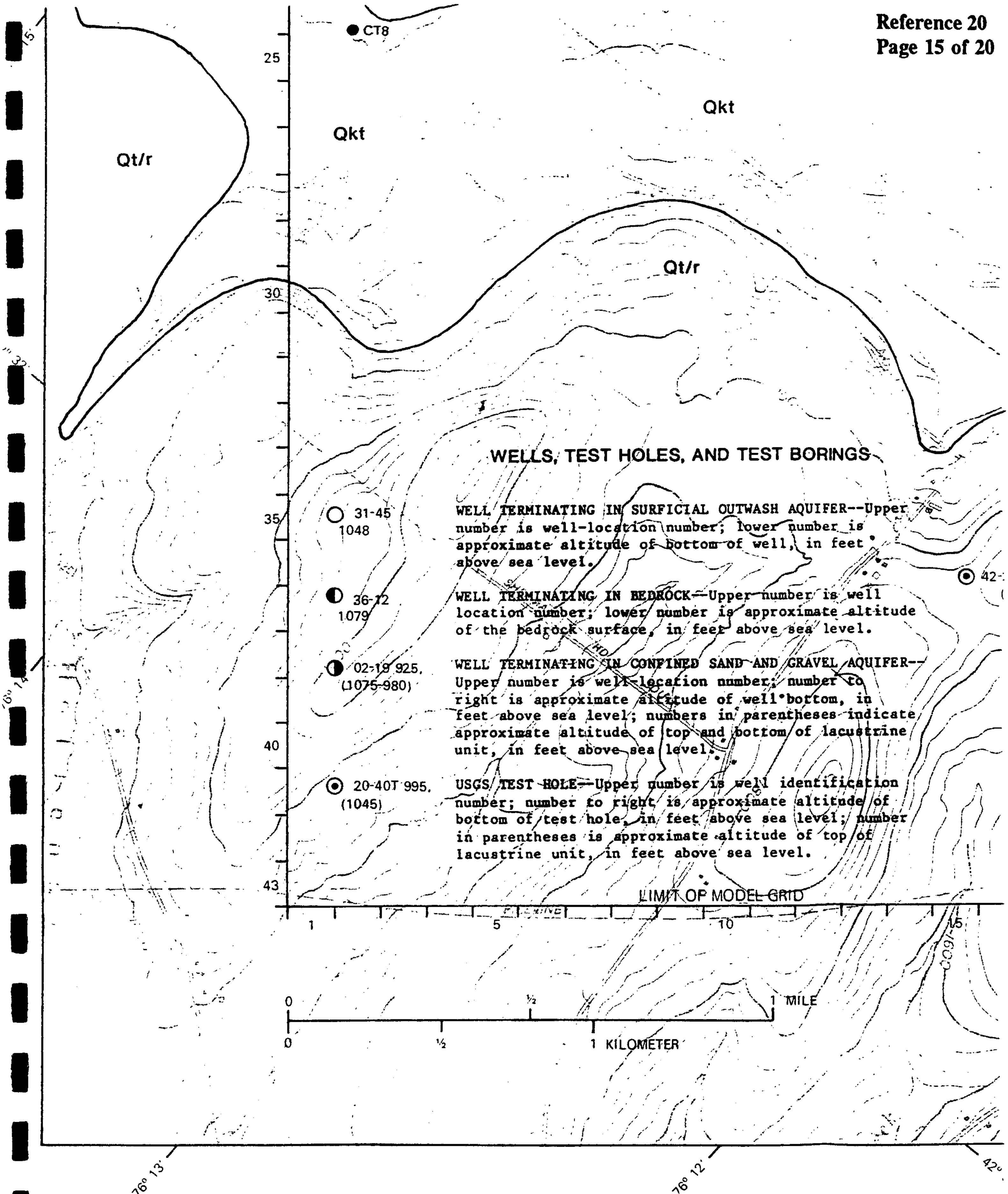
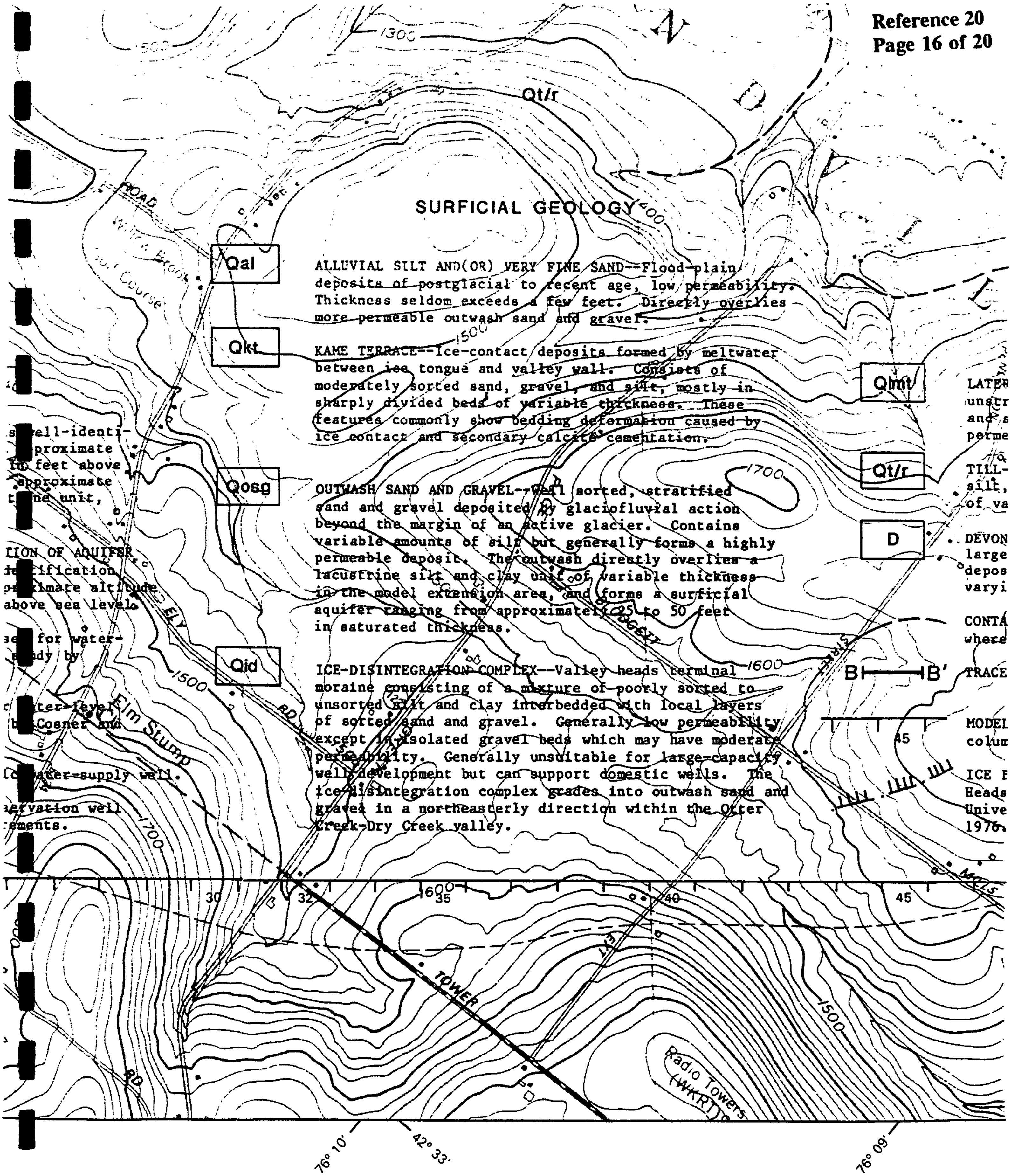


Base from U.S. Geological Survey, 1:24,000 series: Groton, 1976, Homer, 1978, McGraw, 1979, NY and New York State Department of Transportation, 1:24,000 series; Cortland, 1974, NY



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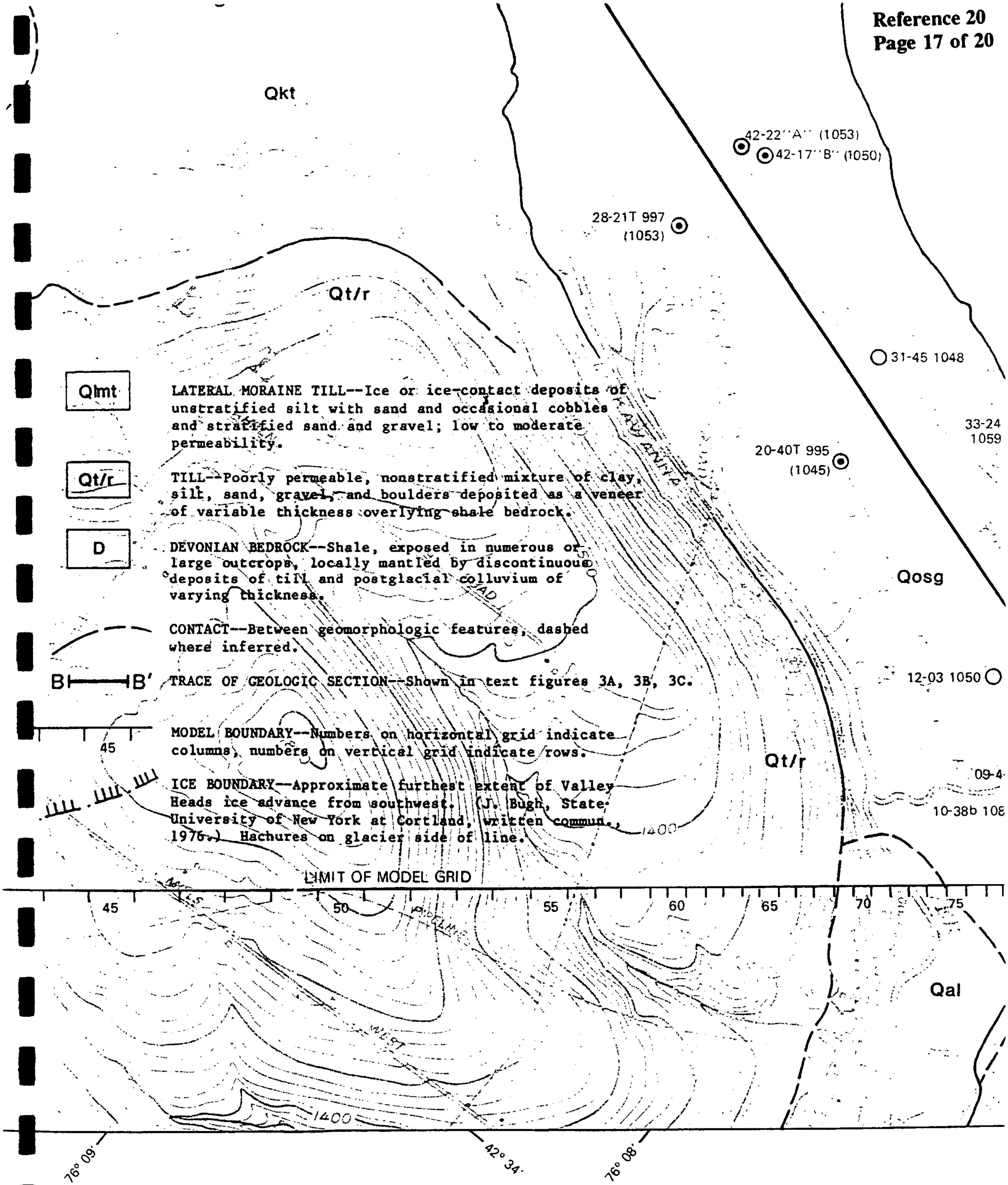

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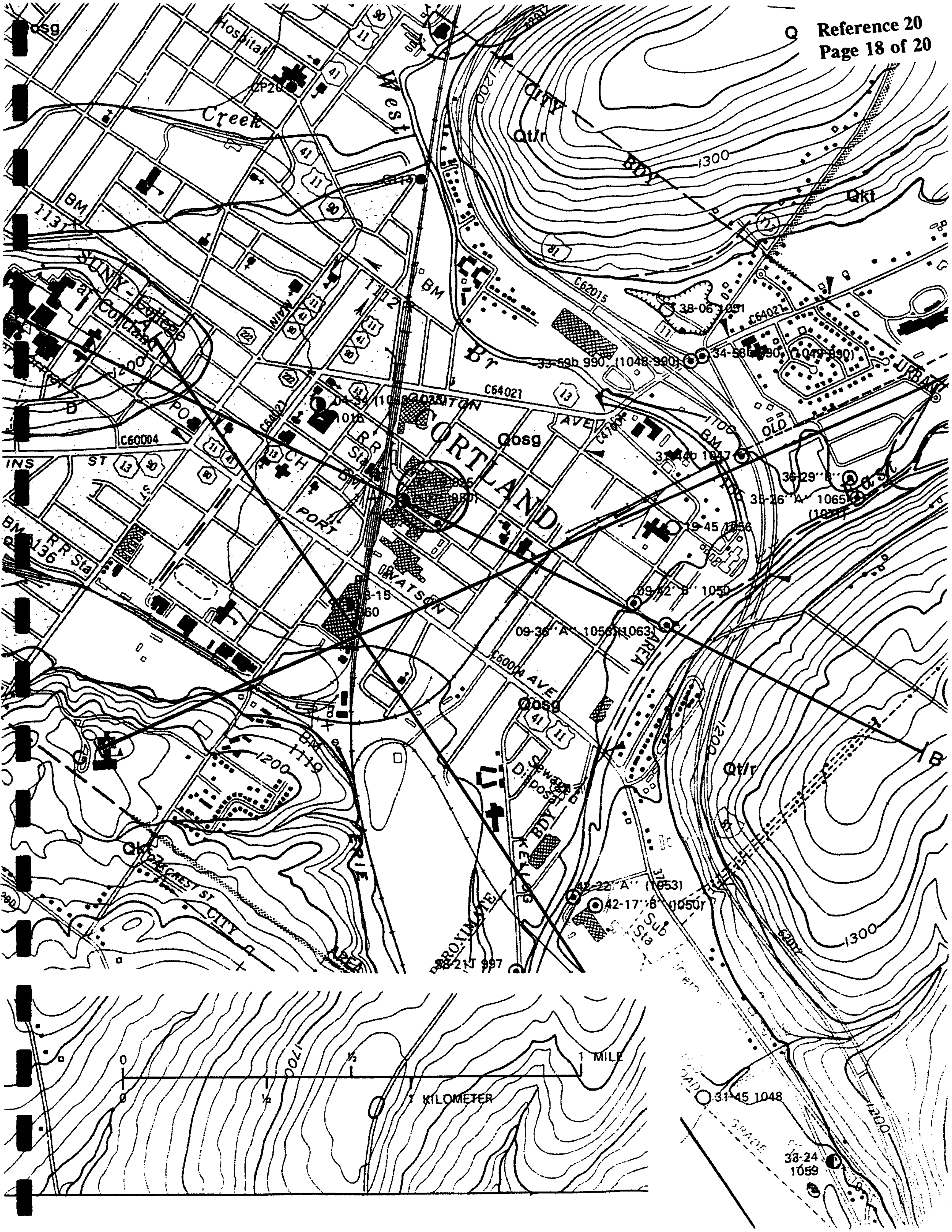
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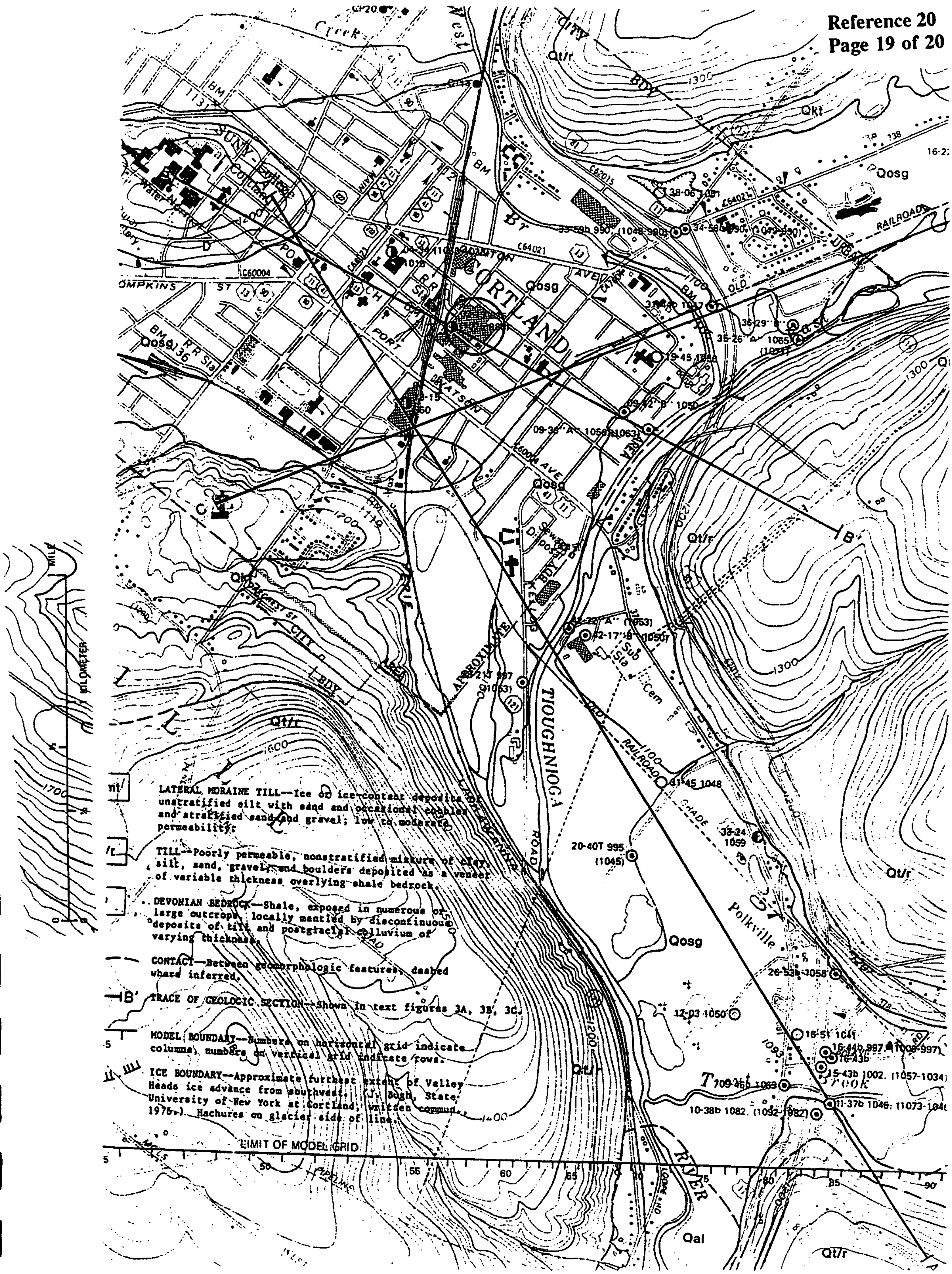
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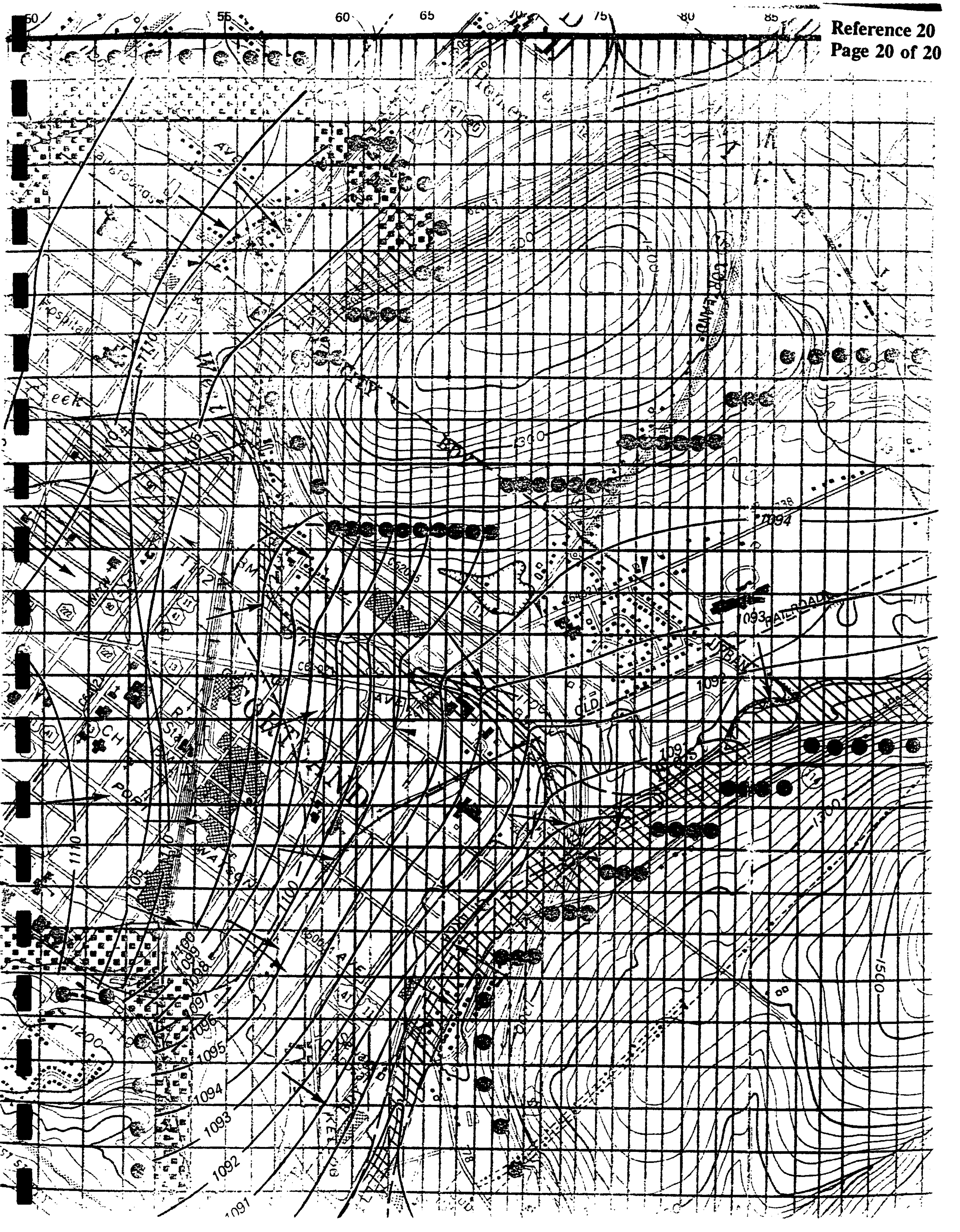
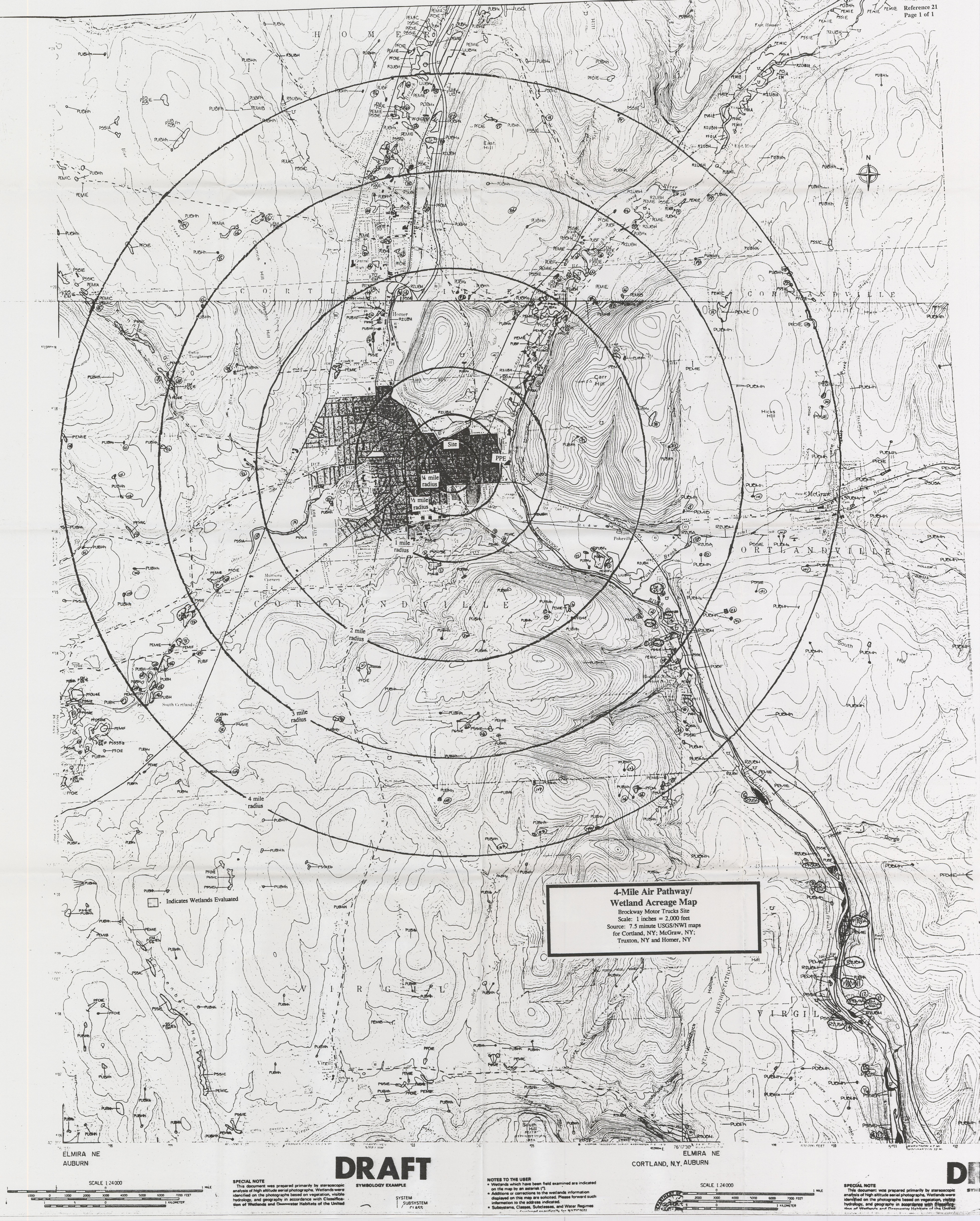
Qkt
Qal
LATERAL MORAINE TILL--Ice or ice-contact deposits of unstratified silt with sand and occasional cobbles and stratified sand and gravel; low to moderate permeability.
TILL--Poorly permeable, nonstratified mixture of clay, silt, sand, gravel, and boulders deposited as a veneer of variable thickness overlying shale bedrock.
DEVONIAN BEDROCK--Shale, exposed in numerous or large outcrops, locally mantled by discontinuous deposits of till and postglacial colluvium of varying thickness.
CONTACT--Between geomorphologic features, dashed where inferred.
B' TRACE OF GEOLOGIC SECTION--Shown in text figures 3A, 3B, 3C.
MODEL BOUNDARY--Numbers on horizontal grid indicate columns, numbers on vertical grid indicate rows.
ICE BOUNDARY--Approximate furthest extent of Valley Heads ice advance from southwest. (J. Bugh, State University of New York at Cortland, written commun., 1976.) Hachures on glacier side of line.
LIMIT OF MODEL GRID
KILOMETER
MILE


50
55
60
65
75
80
85
Creek
1110
1100
1099
1098
1097
1096
1095
1094
1093
1092
1091
1094
1093
RAILROAD
1200
1300
1500

Reference 21


4-Mile Air Pathway/
Wetland Acreage Map
Brockway Motor Trucks Site
Scale: 1 inches = 2,000 feet
Source: 7.5 minute USGS/NWI maps
for Cortland, NY; McGraw, NY;
Truxton, NY and Homer, NY
Indicates Wetlands Evaluated
Site
PPE
¼ mile radius
½ mile radius
1 mile radius
2 mile radius
3 mile radius
4 mile radius
HOMER
CORTLANDVILLE
VIRGIL
McGraw
Carr Hill
Hicks Hill
South Hill
South Cortland
East Hill
ELMIRA NE
AUBURN
DRAFT
CORTLAND, N.Y. AUBURN
SCALE 1:24 000
SPECIAL NOTE
SYMBOLOGY EXAMPLE
NOTES TO THE USER

Reference 22

January 24, 1995

Ebasco Environmental
2111 Wilson Boulevard, Suite 435
Arlington, VA 22201-3058

Attn: Jeff Martin

We have the following information you requested , according to our deed file records, in the Real Property Tax Services Office.

86.52-03-04 The Cortland Corporation, formerly Brockway Motor Company, Inc. to Mack Trucks, Inc. 1-4-60
Mack Trucks, Inc. to Canford Manufacturing Corporation 2-26-80
Canford Manufacturing Corporation to Cortland County Industrial Development Agency 4-1-80

86.51-02-31 Durkee's Bakery, Inc. to Mack Trucks, Inc. 10-26-73
Mack Trucks, Inc. to SCM Corporation 11-27-78
SCM Corporation to Lawrence P. Brooks, Robert Lacey, Frederick G. Compagni 4-4-86
Lawrence P. Brooks, Robert Lacey, Frederick G. Compagni to Richard C. DiCicco and Carmine Todisco 12-24-86
Richard C. DiCicco and Carmine Todisco to Richard C. DiCicco and Carmine Todisco 2-27-87

86.51-03-07.2 Mack Trucks, Inc. to Michael Brown, d/b/a Round House Mill 9-8-78
Michael Brown to New York State Electric and Gas Corporation 6-3-81

86.52-03-02 Mack Trucks, Inc to Paul A. Sepe and Georgianna T. Sepe 3-7-79
Paul A. Sepe and Georgianna T. Sepe to Canford Manufacturing Corporation 6-4-85

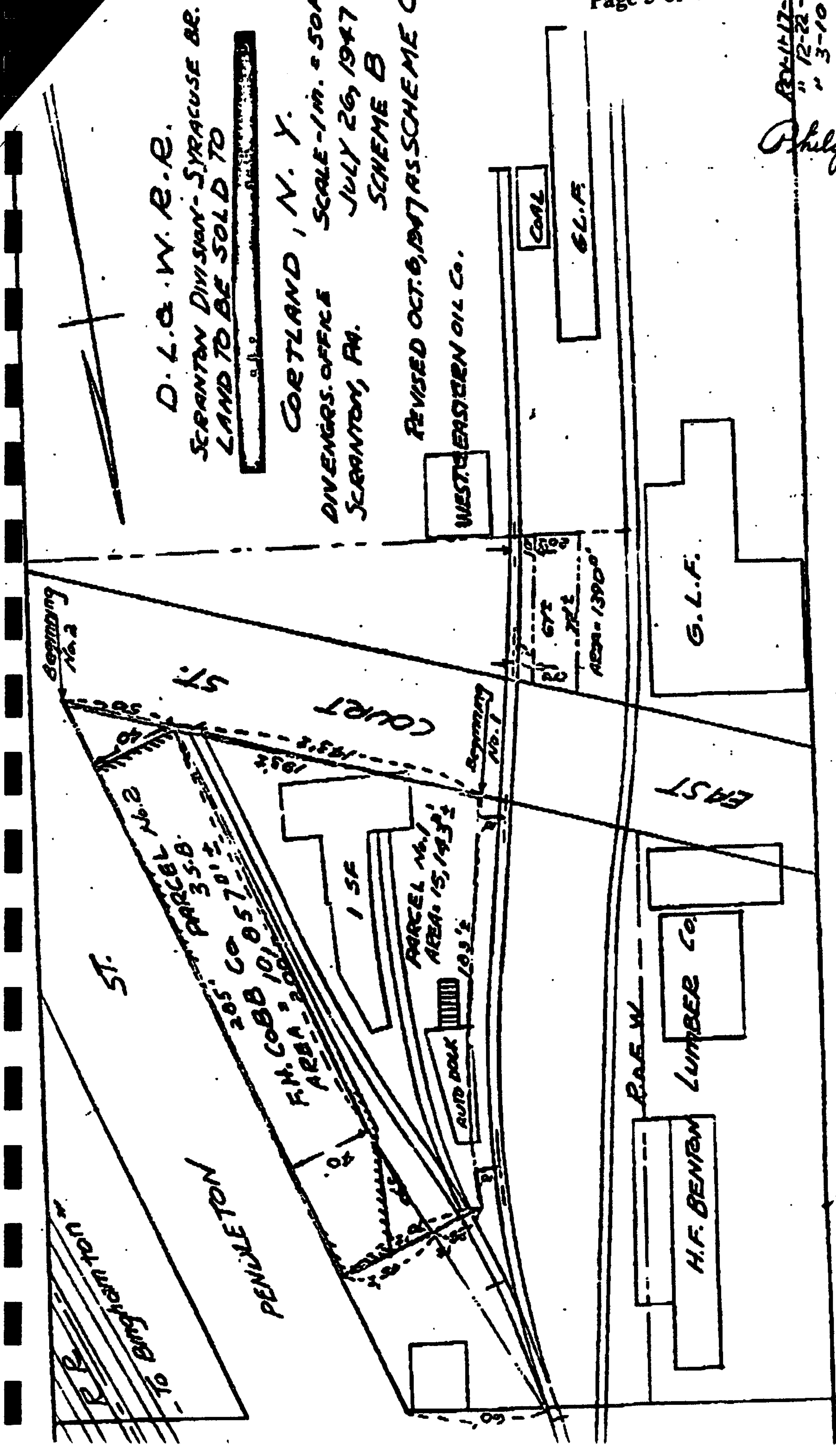
86.60-02-01.1 Mack Trucks, Inc. to Frederick G. Compagni 2-26-80
Frederick G. Compagni to Canford Manufacturing Corporation 3-20-85
Canford Manufacturing Corporation to Rubbermaid-Cortland
We do not have a deed for this transfer.
Rubbermaid-Cortland to Cortland County Industrial Development Agency 8-25-88

86.51-03-07.1 Mack Trucks, Inc. to Michael Brown, d/b/a Round House Mill 9-8-78

86.59-02-10 Our records do not go back far enough to show this was a portion of Mack Trucks, Inc.

86.52-03-08.2 This is not a valid number.

86.60-02-03 (now consolidated with 86.60-02-01.1) Mack Trucks, Inc. to Joseph Compagni and Jane M. Compagni and Joseph H. Compagni 8-27-79
Joseph Compagni and Jane M. Compagni and Joseph H. Compagni to Canford Manufacturing Corp. 8-12-85



86.59-02-10

Fingerlakes Affiliates Inc to Harvey M Philip A Rosen 8/30/68

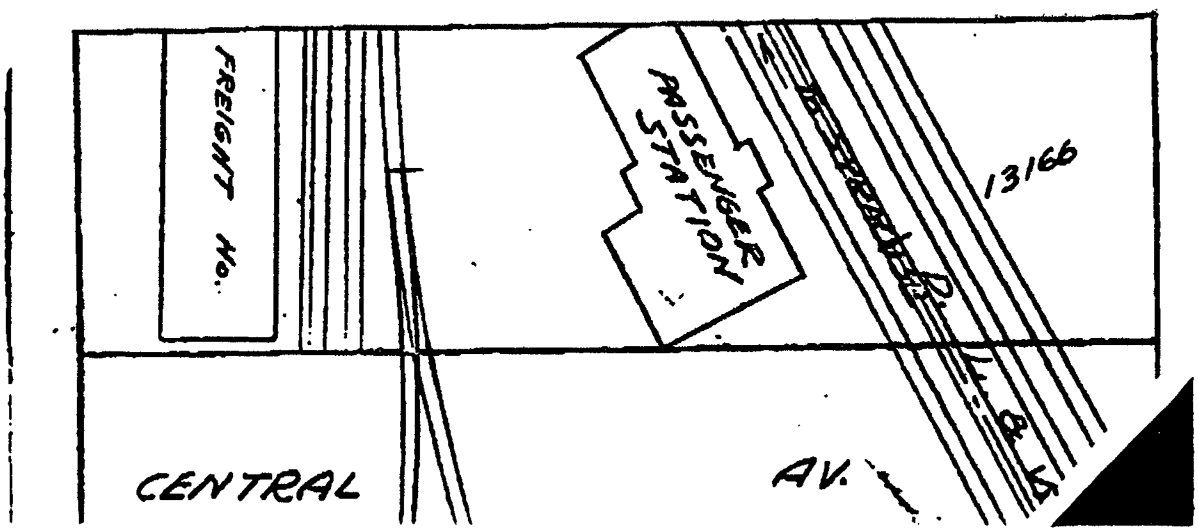
Philip A Rosen to Harvey M Rosen 1/12/81

Harvey M Rosen to F.G. Compagni Sr. 4/15/81

Harvey M. Rosen to F.G. Compagni Sr. Correction deed 4/13/83

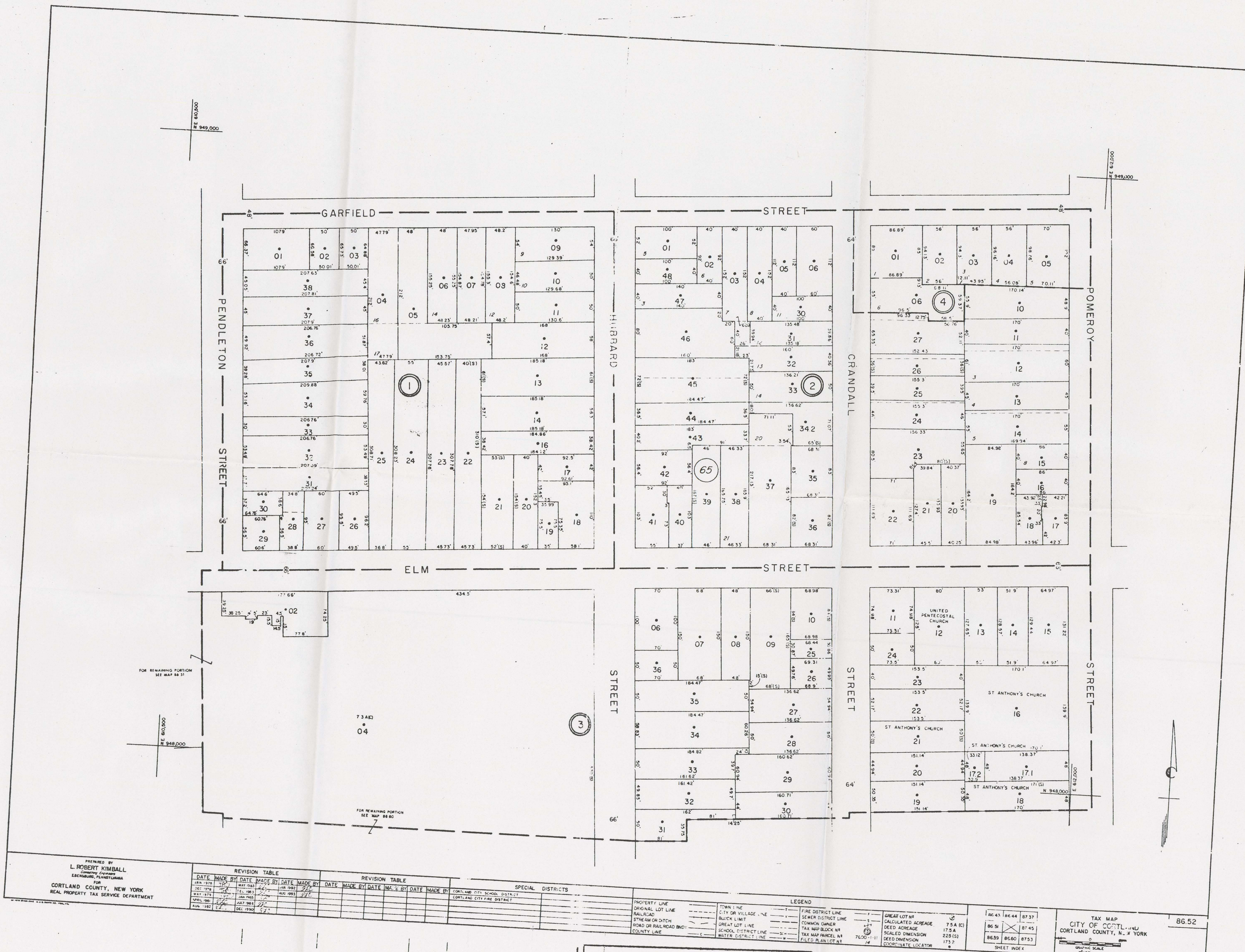
F.G. Compagni Sr. to Natrium Products 6/2/88

Natrium Products.


FREIGHT Ho.
PASSENGER STATION
13166
CENTRAL
AV.

Reference 23

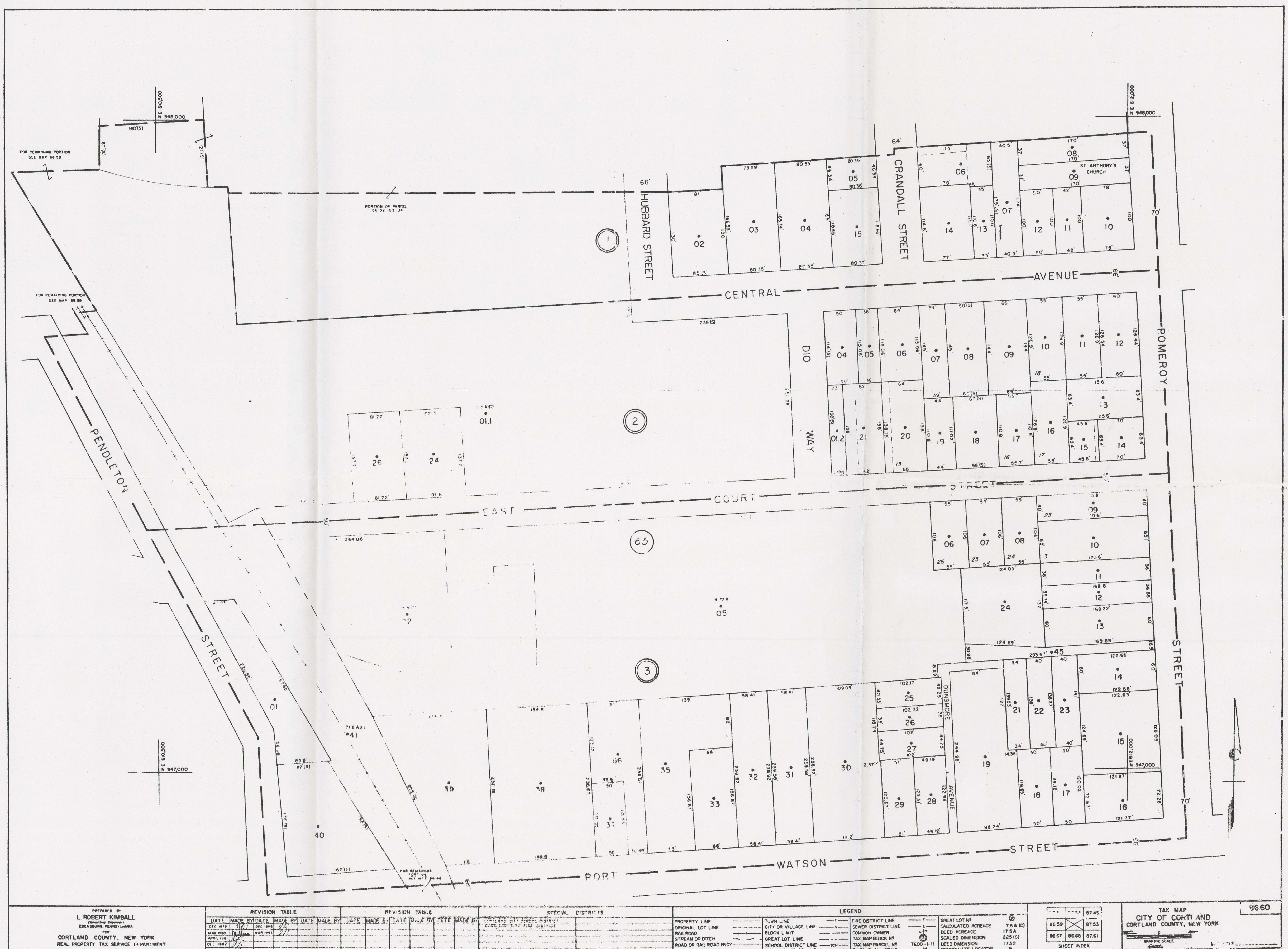
"These maps were prepared for tax purposes only. They are not intended for use in the conveyancing of land. All the information on the maps is subject to such variations and corrections as might result from an accurate instrument survey."



"These maps were prepared for tax purposes only. They are not intended for use in the conveyancing of land. All the information on the maps is subject to such variations and corrections as might result from an accurate instrument survey."

1"=100'±

"These maps were prepared for tax purposes only. They are not intended for use in the conveyancing of land. All the information on the maps is subject to such variations and corrections as might result from an accurate instrument survey."



"These maps were prepared for tax purposes only. They are not intended for use in the conveyancing of land. All the information on the maps is subject to such variations and corrections as might result from an accurate instrument survey."

Reference 24

SANBORN MAP LEGEND

CODING OF FIRE-RESISTIVE STRUCTURAL UNITS FOR FIREPROOF AND NON-COMBUSTIBLE BUILDINGS

FRAMING

CODE	STRUCTURAL UNIT
A.	Reinforced Concrete Frame.
B.	Reinforced Concrete Joists, Columns, Beams, Trusses, Arches, Masonry Piers.
C.	Protected Steel Frame.
D.	Individually Protected Steel Joists, Columns, Beams, Trusses, Arches.
E.	Indirectly Protected Steel Frame.
F.	Indirectly Protected Steel Joists, Columns, Beams, Trusses, Arches.
G.	Unprotected Steel Frame.
H.	Unprotected Steel Joists, Columns, Beams, Trusses, Arches.
I.	Masonry Bearing Walls only.

FLOORS

CODE	STRUCTURAL UNIT
1.	Reinforced Concrete. Reinforced Concrete with Masonry Units. Pre-cast Concrete or Gypsum Slabs or Planks.
2.	Concrete on Metal Lath, Incombustible Form Boards, Paper-backed Wire Fabric, Steel Deck, or Cellular, Ribbed or Corrugated Steel Units.
3.	Open Steel Deck or Grating.

ROOF

CODE	STRUCTURAL UNIT
a.	Reinforced Concrete. Reinforced Concrete with Masonry Units. Reinforced Gypsum Concrete. Pre-cast Concrete or Gypsum Slabs or Planks.
b.	Concrete or Gypsum on Metal Lath, Incombustible Form Boards, Paper-backed Wire Fabric, Steel Deck, or Cellular, Ribbed or Corrugated Steel Units.
c.	Incombustible Composition Boards with or without Insulation. Masonry or Metal Tiles.
d.	Steel Deck, Corrugated Metal or Asbestos Protected Metal with or without Insulation.

The coding to left, for framing, floor and roof structural units is used in describing the construction of fire-resistive buildings. In addition, reports for fire-resistive buildings will show the date built, wall construction other than brick, and ceilings.

FP - 1962 (CONC.) A - 1 - a — A fireproof building built in 1962 with concrete walls and reinforced concrete frame, floors and roof.

FPX - 1962 (METAL PANELS) B - 2 - a (NONCOMB CEIL'GS) — A fireproof building built in 1962 with metal panel walls, reinforced concrete columns and beams, concrete floors on metal lath and gypsum slab roof; non-combustible ceilings.

NC - 1962 (C. B.) H - 2 - d — A noncombustible building built in 1962 with concrete block walls; unprotected steel columns, beams and joists; concrete floors on metal lath and steel deck roof.

MASONRY CONSTRUCTION

Important interior and all exterior masonry walls of all non-residential buildings and residential buildings of five or more dwelling units are shown with weighted (▬▬) lines.

Masonry walls of residential buildings of four dwelling units or less are shown with a standard line and the construction is noted on all buildings diagramed after July, 1963.

WALLS

- 8" Brick
- (CONC) 12" Concrete
- (STONE) 18" & 20" Stone
- (TILE) 12" & 8" Hollow Tile Wall Thicknesses Placed Relative to Respective Floors
- (C BR) Cinder, Concrete or Cement Brick
- (C B) (PLASTR) Hollow Cinder or Concrete Blocks, Plastered
- (CBBR F) Mixed Construction of Concrete Blocks, Brick Faced
- (C B & BK) Mixed Construction of Concrete Blocks & Brick
- (METAL F) Masonry Walls, Metal Faced
- (ADOBE) Adobe
- C B — Hollow Cinder or Concrete Block Interior Wall Basement to Roof
- TILE — Tile Interior Wall Basement to Roof
- C BR — Cement Brick End Wall

PARTITIONS

- Frame
- TILE TO CEILING — Tile from Foundation to Top Ceiling only
- CONC 1ST — Concrete 1st Floor only
- C B 1ST — Hollow Cinder or Concrete Block 1st Floor only
- BR 2ND — Brick 2nd Floor only
- TILE 1 & 3 — Tile 1st & 3rd Floors only

OPENINGS

(Interior)

- Wall with No Openings
- Wall with Double Standard Fire Doors 1st Floor
- Wall with Standard Fire Door Basement
- Wall with Substandard Fire Doors 1st & 3rd Floors
- Wall with Metal & Wired Glass Fire Doors all Floors
- Wall with Substandard Fire Doors 1st, 2nd & 3rd Floors & Unprotected Opening 4th Floor
- Wall with Small Unprotected Openings only
- Wall with Unprotected Openings all Floors

(Exterior)

- 1st Floor
- 1st & 2nd Floors
- 3rd Floor
- 1st & 4th Fl. with Metal Shutter 1st.
- 10th & 22nd only
- 10th to 22nd Fl.
- Glass Block
- Wired Glass in Metal Sash 2nd & 3rd Fl.

NON-MASONRY CONSTRUCTION

Non-masonry walls are shown with fine (———) lines.
(Wall construction other than wood and stucco on wood frame is noted)

- Wood & Stucco & Cement Plaster, Etc. on Wood Frame
- (VEN'D) Brick Veneered on Wood Frame (Other Types of Veneered on Wood Frame Specifically Noted)
- Mixed Masonry & Non-Masonry (Type of Masonry Specifically Noted)
- (BR FILLED) Wood, Brick Lined, Br. Filled or Brick Nogged
- (WOOD & GLASS) Wood Sash & Glass
- (IR & GLASS) Metal Sash & Glass
- (IR CL) Metal Clad on Wood Frame
- (IRON) Iron Building
- (IR) WOOD RF — Iron Building with Wood Roof. (Location of Extensive Wood Areas Specifically noted)
- (ASB CL) Asbestos Clad on Wood Frame, Noted in Non-Residential Structures only.
- (C B 9' GLASS ABV) Mixed Wall--9' of CB With Metal Sash Above
- (METAL PANELS) Metal Panels
- (C B S) Apron Walls With Wood Sash and Glass
- (M L & P STEEL FR) Stucco, Cement Plaster, Etc. on Steel Frame
- (GUNITE STEEL FR) Gunite on Steel Frame
- (A P M) STEEL FR — Asphalt and/or Asbestos Protected Metal on Steel Frame
- (A.P.M) WOOD FR — Asphalt and/or Asbestos Protected Metal on Wood Frame
- (GLASS PANELS) Glass Panels

FIRE PROTECTION

- Fire Department Connection
- (AS) THRU-OUT — Automatic Sprinklers throughout contiguous sections of single risk
- (AS) Automatic Sprinklers all floors of building
- (AS) 1ST ONLY — Automatic Sprinklers in part of building only (Note under Symbol indicates protected portion of building)
- (NS) Not Sprinklered
- (ACS) Automatic Chemical Sprinklers
- Chemical Sprinklers in part of building only (Note under Symbol indicates protected portion of building)
- VP HYD — Vertical Pipe or Stand Pipe
- AFA — Automatic Fire Alarm
- (WT) Water Tank
- FE — Outside Vertical Pipe on fire escape
- (FA) Fire Alarm Box Noted "HPFS" on High Pressure Fire Service
- Single Hydrant
- D.H. — Double Hydrant
- T.H. — Triple Hydrant
- Q.H. HPFS — Quadruple Hydrant of the High Pressure Service
- 20"W.P. (HPFS) — Water Pipes of the High Pressure Service
- +12"+ — Water Pipes of the High Pressure Service as Shown on Key Map
- 6" W.P. / 4" W.P. — Public Water Service
- 6" W.P. (PRIV) — Private Water Service

VERTICAL OPENINGS

- Skylight lighting top story only
- 3 — Skylight lighting 3 stories
- WG — Skylight with Wired Glass in Metal Sash
- E — Open Elevator
- FE — Frame Enclosed Elevator
- ET — Frame Enclosed Elevator with Traps
- ESC — Frame Enclosed Elevator with Self Closing Traps
- CBET — Concrete Block Enclosed Elevator with Traps
- TESC — Tile Enclosed Elevator with Self Closing Traps
- BE — Brick Enclosed Elevator with Wired Glass Door
- H — Open Hoist
- HT — Hoist with Traps
- H B TO 1 — Open Hoist Basement to 1st
- Stairs

MISCELLANEOUS

- MANSARD ROOF — Number of Stories; Height in Feet; Composition Roof Covering
- Parapet 6" above Roof; Frame Cornice; Parapet 12" above Roof
- W. HO. — Parapet 24" above Roof; Occupied by Warehouse; Metal, Slate, Tile or Asbestos Shingle Roof Covering; Parapet 48" above Roof
- S 2B 2-D. A IN B AB 1ST — 2 Stories & Basement; 1st Floor Occupied by Store; 2 Residential Units above 1st; Auto in Basement; Drive or Passageway; Wood Shingle Roof
- IR CH — Iron Chimney
- IR.CH. S.A — Iron Chimney (with Spark Arrestor)
- UPB — Vertical Steam Boiler
- Horizontal Steam Boiler
- Brick Chimney
- G.T. — Gasoline Tank
- Fire Pump
- CURB LINE 50 — Width of Street between Block Lines, not Curb Lines
- (15) Ground Elevation
- 56 / 416 — House numbers nearest to Buildings are Official or Actually up on Buildings. Old House Numbers are Farthest from Buildings
- 24 — Reference to Adjoining Page
- 5 — Block Number
- Fire Department as shown on Key Map
- Vac. or V. - Vacant
- Vac. & Op. or V.-O. - Vacant & Open

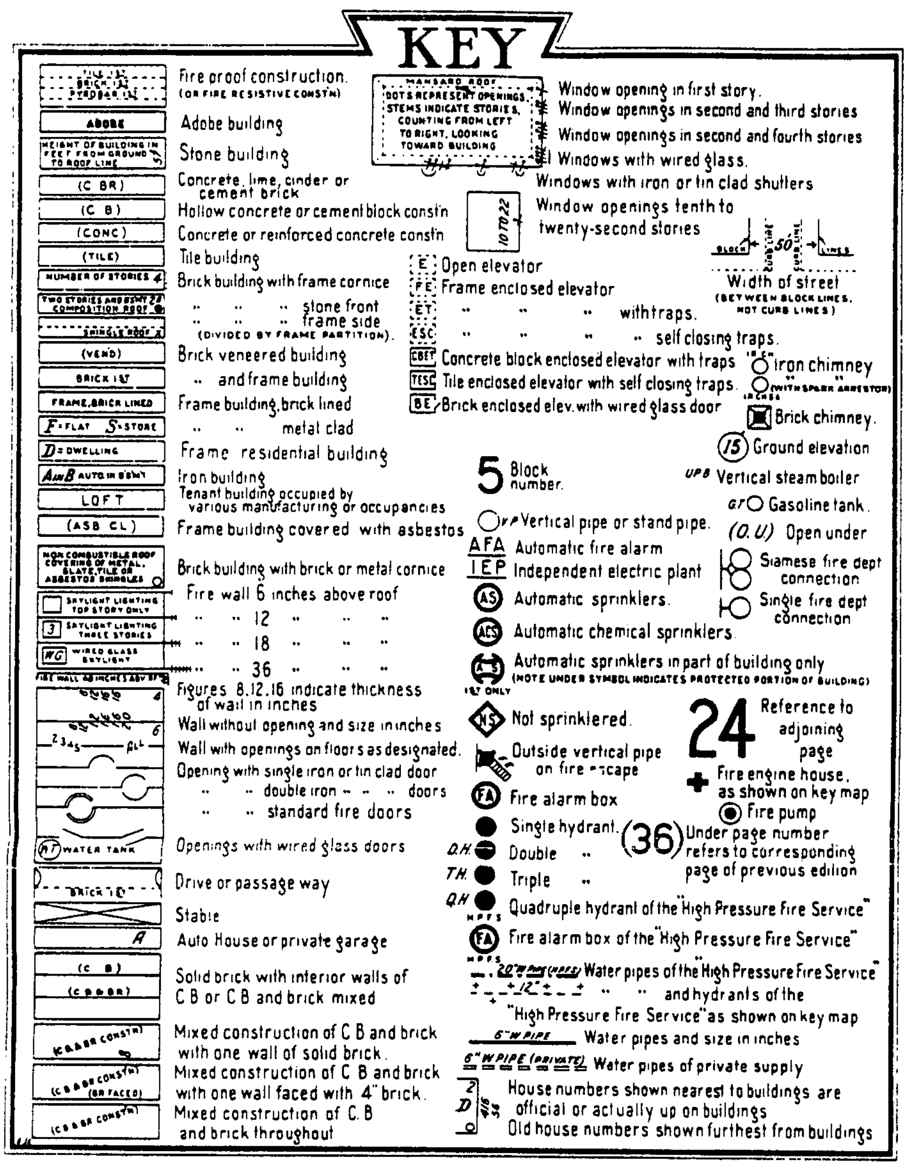
GLOSSARY

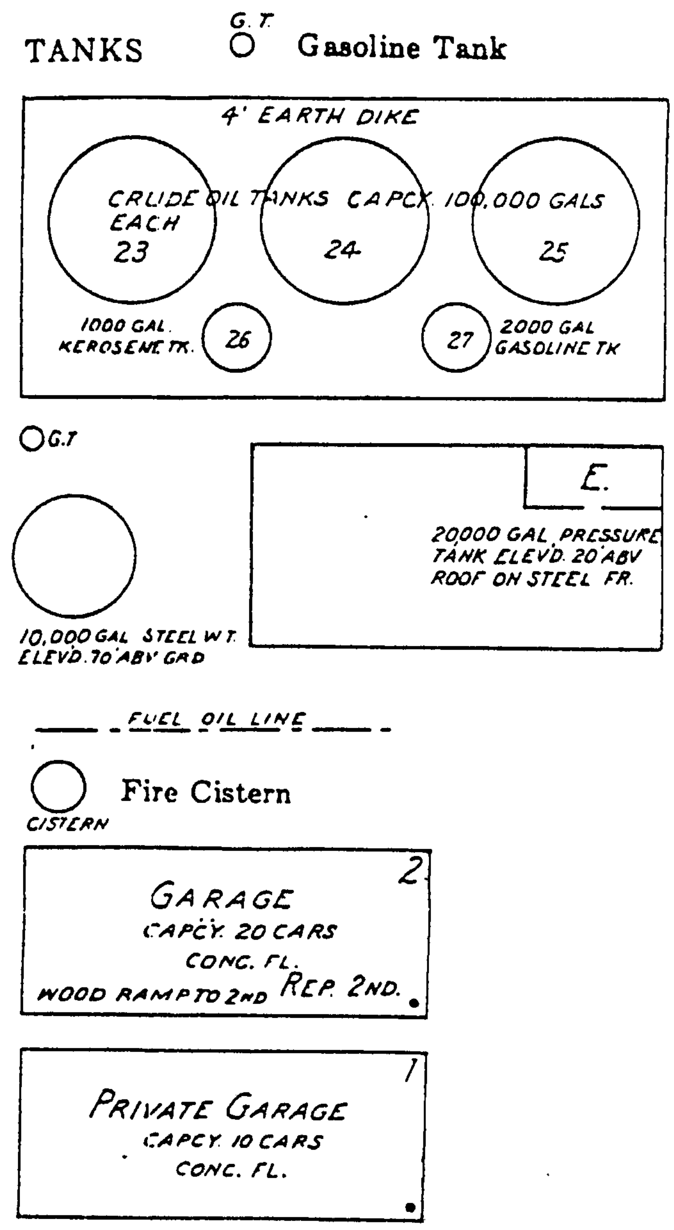
A - B LINES An arbitrary boundary between adjoining sheets.
A. Private garage.
ABV. Above.
A.F.A. Equipped with fire detecting devices which automatically signal a central fire department.
AIR COND. Air cooling system employing ducts through floors.
APRON WALL. A masonry wall extending 5' or less above foundation.
ASSOC. RISK Risk not underwritten by Stock Fire Ins. Companies.
BASEMENT A story having its floor below ground & its ceiling at least 4' above ground.
Cook County, Ill. A floor of a building next below the first floor. Shown by the symbol B following story height. Sub-basements or sub-cellars, (stories below the 1st basement), are shown by the symbol SB following basement symbol.
CHIMNEYS (Applicable to maps in Rocky Mountain & Pacific Coast States)
BC. Brick, stone, concrete brick & concrete chimneys.
C.BL.C. Concrete block chimney.
C.C. Non-standard concrete chimney.
T.C. Tile chimney.
P.C. Patent chimney.
IR. CH. Iron chimneys.
S.P. Stove pipe.
S.P.V. Stove pipe with patent ventilator.

RESIDENTIAL OCCUPANCY SYMBOLS
D. Single family unit or as qualified by a numeral.
F. - APTS. A multi-family residential building corresponding with local Rating Bureau definition in family units per floor, story height, & separation of entrance.
ROOM'G. A residential building normally occupied by a single family but with 10 or more rooms rented for lodging purposes.
EXCEPTIONS: 6 rooms in Arizona, California, Nevada, Utah & Montana; 5 rooms in Oregon & Washington; 4 rooms in Idaho & Hawaii.

FIRE RESISTIVE CONSTRUCTION SYMBOLS
F.P. Approved masonry walls, floors & roof, interior supports of approved masonry, concrete, and/or protected steel.
F.P.X. F. P. qualifications except inferior or sub-standard walls.
N.C. Fire resistive with unprotected structural steel units.
HOLLOW WALL. A bonded masonry wall having a continuous air space within.
I.E.P. Independent Electric Plant.
IMPASSABLE Not traversable due to condition of terrain.
LEDGED WALL. A masonry bearing wall with extended ledges to support floors.
LOFT Tenanted by industrial occupancies.
M.L. & P. Concrete or plaster applied to metal lath on wood studdings.
M.S. & G. Metal sash & glass.
NOT OPEN Streets appearing on records but not open on ground.
O.L. Windows overlooking the roof above the corresponding floor of an adjoining building.
O.U. Open between ground and first floor.
PILAST'D. Masonry reinforcing columns in walls.
SKYTS. Skylights.
SL. CL. Slate attached to wood siding.
SM. HO. Smoke House.
STABLE Shown by crossing diagonal lines on diagram.
SUSP'D. Suspended ceilings below floor and/or roof beams.
SYST. System.
TRANSF. Transformer.
WD. Wood.

R	RESIDENTIAL	M	[illegible]
RT	RESIDENTIAL-TRANSIENT	P	[illegible]
C	COMMERCIAL	U	UTILITY
W	[illegible]	T	TRANSPORTATION





CODING OF STRUCTURAL UNITS FOR FIREPROOF AND NON-COMBUSTIBLE BUILDINGS

FRAMING

CODE	STRUCTURAL UNIT
A.	Reinforced Concrete Frame.
B.	Reinforced Concrete Joists, Columns, Beams, Trusses, Arches, Masonry Piers.
C.	Protected Steel Frame.
D.	Individually Protected Steel Joists, Columns, Beams, Trusses, Arches.
E.	Indirectly Protected Steel Frame.
F.	Indirectly Protected Steel Joists, Columns, Beams, Trusses, Arches.
G.	Unprotected Steel Frame.
H.	Unprotected Steel Joists, Columns, Beams, Trusses, Arches.
O.	Masonry Bearing Walls.

FLOORS

CODE	STRUCTURAL UNIT
1.	Reinforced Concrete. Reinforced Concrete with Masonry Units. Pre-cast Concrete or Gypsum Slabs or Planks.
2.	Concrete on Metal Lath, Incombustible Form Boards, Paper-backed Wire Fabric, Steel Deck, and Cellular, Ribbed or Corrugated Steel Units.
3.	Open Steel Deck or Grating.

LAND USE CODE APPLICABLE TO CHANGES DIAGRAMMED AFTER 5/66

R	RESIDENTIAL	M	MANUFACTURING
RT	RESIDENTIAL - TRANSIENT	P	PUBLIC OR INSTITUTIONAL
C	COMMERCIAL	U	UTILITY
W	WAREHOUSE	T	TRANSPORTATION

NUMERICAL PREFIX INDICATES THE NUMBER OF ESTABLISHMENTS IN EACH CATEGORY

ROOF

CODE	STRUCTURAL UNIT
a.	Reinforced Concrete. Reinforced Concrete with Masonry Units. Reinforced Gypsum Concrete. Pre-cast Concrete or Gypsum Slabs or Planks.
b.	Concrete or Gypsum on Metal Lath, Incombustible Form Boards, Paper-backed Wire Fabric, Steel Deck, and Cellular, Ribbed or Corrugated Steel Units.
c.	Incombustible Composition Boards with or without Insulation. Masonry or Metal Tiles.
d.	Steel Deck, Corrugated Metal or Asbestos Protected Metal with or without Insulation.

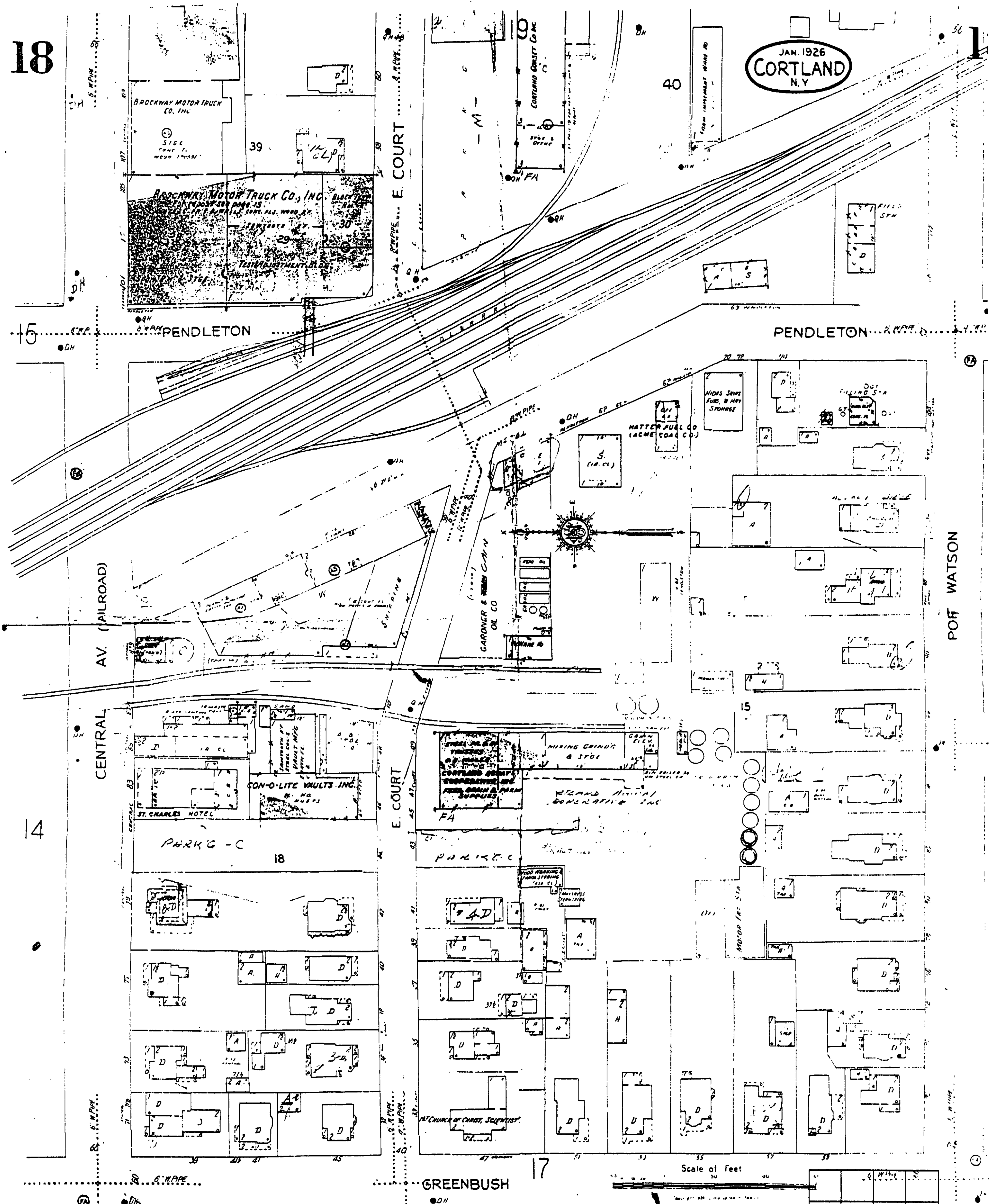
The coding for framing, floor and roof structural units as shown above is used in describing the construction of fire-resistive buildings. In addition, reports for fire-resistive buildings will show the date built and wall construction when other than brick.

F P buildings have masonry floors and roof; concrete and/or directly or indirectly protected steel framing; and clay brick, stone or poured concrete walls.

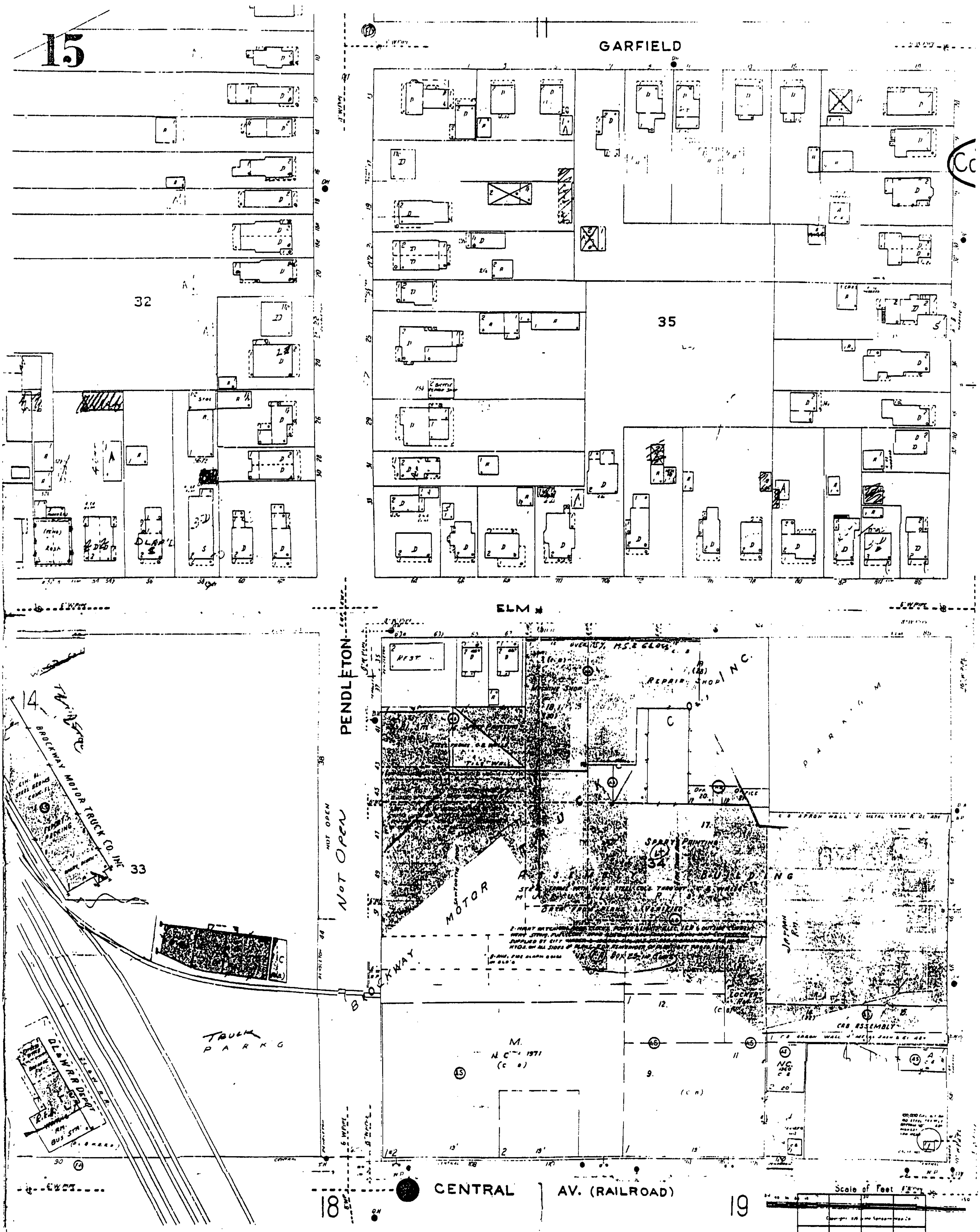
F P X buildings are F P buildings with inferior walls such as concrete block, cement brick, metal or glass panels, etc.

N C buildings have unprotected steel framing and fire-resi[redacted]

FP-1962 (CONC.) A-1-a	A fire-resistive building built in 1962 with concrete walls and reinforced concrete frame, floors and roof.
FPX-1962 (METAL PANELS) E-2-b NONCOMB CEIL'G	A fire-resistive building built in 1962 with metal panel walls, indirectly protected steel frame, concrete floors and roof on metal lath, noncombustible ceilings.
NC-1962 (C. B.) H-2-d	A noncombustible building built in 1962 with concrete block walls; unprotected steel columns and beams; concrete floors on [redacted]


18
JAN. 1926
CORTLAND
N.Y.
BROCKWAY MOTOR TRUCK CO., INC.
PENDLETON
PENDLETON
E. COURT
E. COURT
CENTRAL AV. (RAILROAD)
PORT WATSON
GREENBUSH
HATTER FUEL CO (ACME COAL CO.)
GARDNER & CAIN OIL CO.
CON-O-LITE VAULTS INC.
ST. CHARLES HOTEL
CORTLAND CO-OPERATIVE INC.
MIXING GRIND'G & STGE
1st CHURCH OF CHRIST, SCIENTIST
Scale of Feet
39
40
14
15
17
18
19

1971

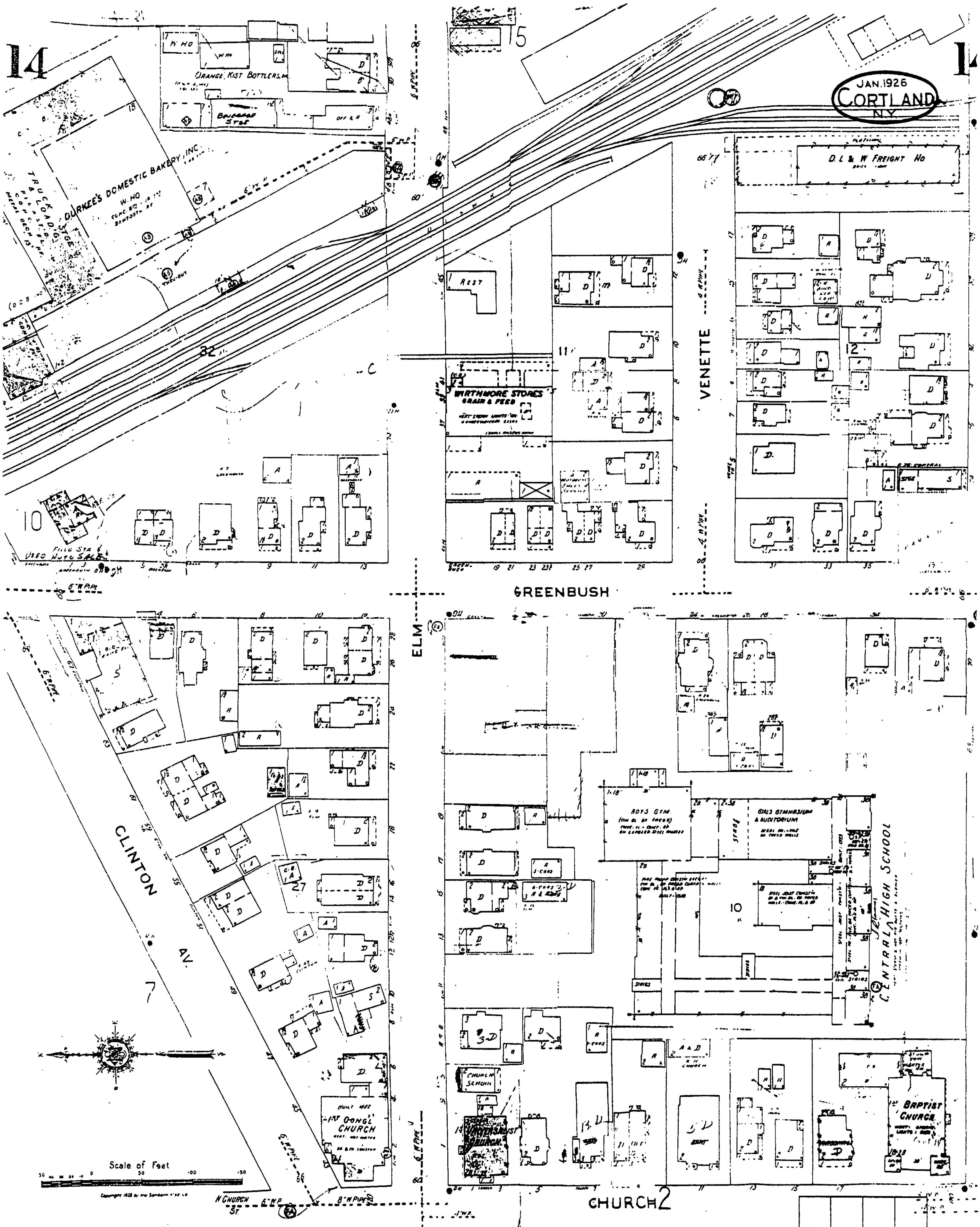


Environmental Risk Information & Imaging Services

505 Huntmar Park Drive, Suite 200 ■ Herndon, VA 22070 ■ (703) 834-0600 ■ 1-800 989-0403 ■ FAX (703) 834-0606

ERIIS

1971

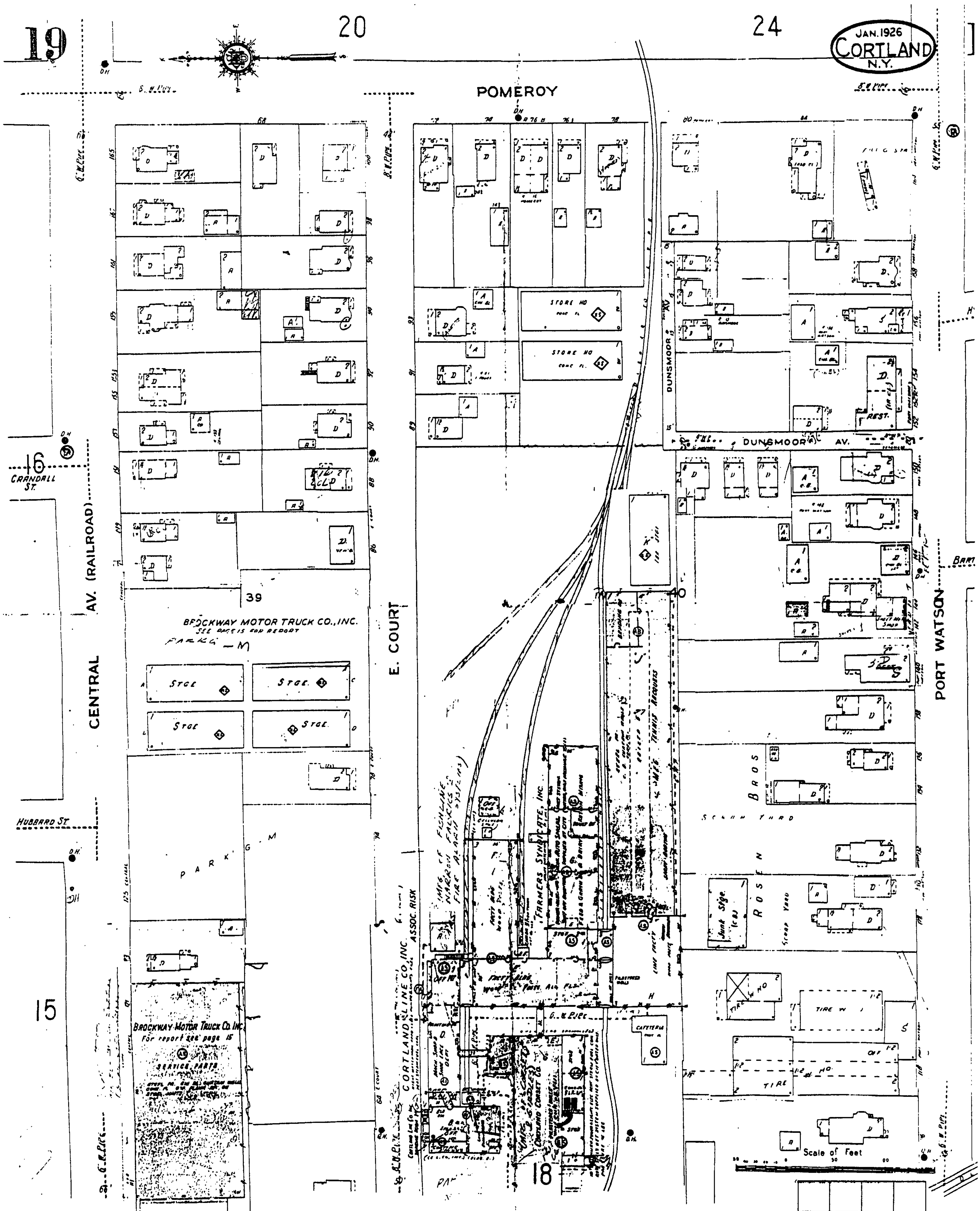


Environmental Risk Information & Imaging Services

505 Huntmar Park Drive, Suite 200 ■ Herndon, VA 22070 ■ (703) 834-0600 ■ 1-800 989-0403 ■ FAX (703) 834-0606

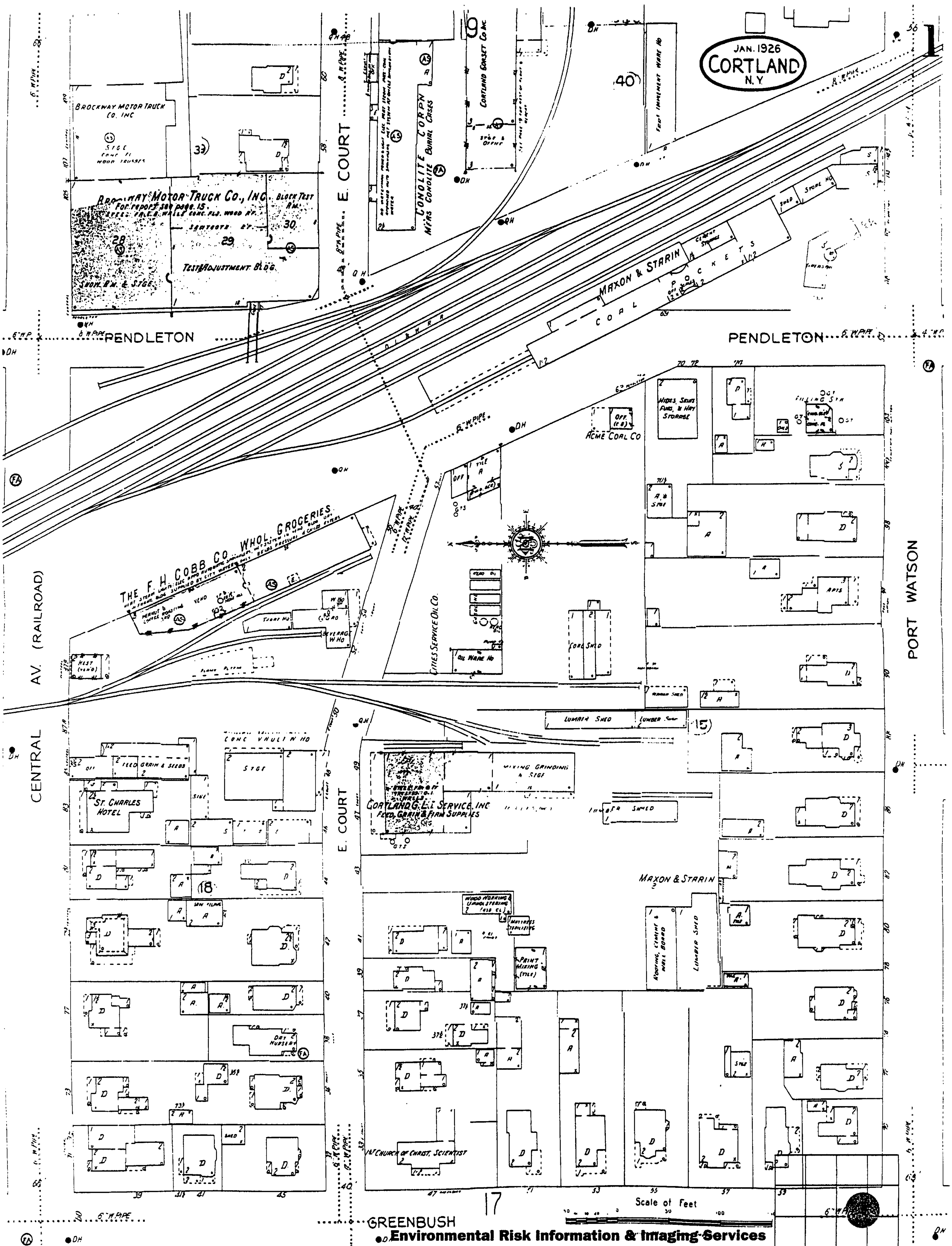
E R I I S

1971

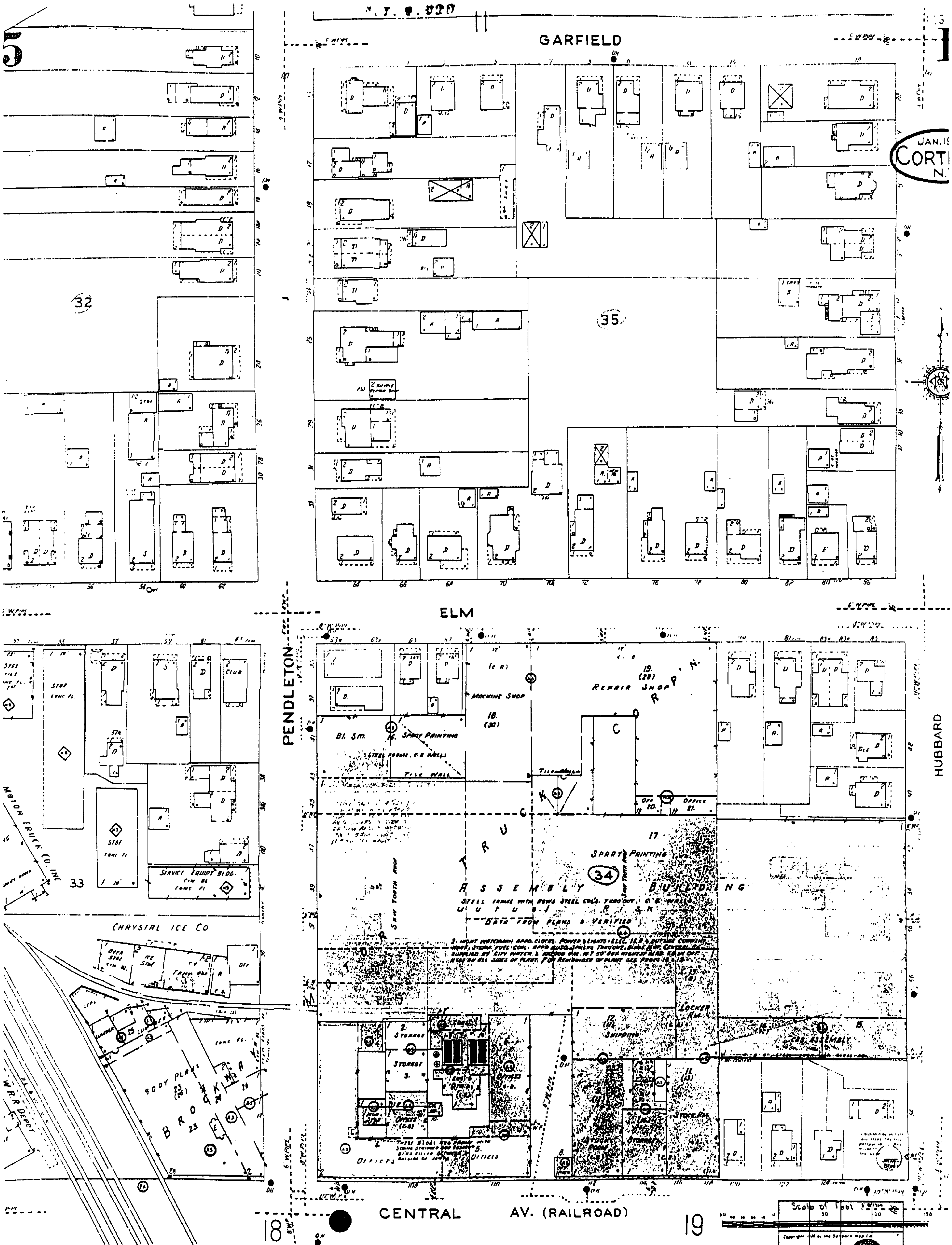


Environmental Risk Information & Imaging Services
505 Huntmar Park Drive, Suite 200 ■ Herndon, VA 22070 ■ (703) 834-0600 ■ 1-800 989-0403 ■ FAX (703) 834-0606
E R I S

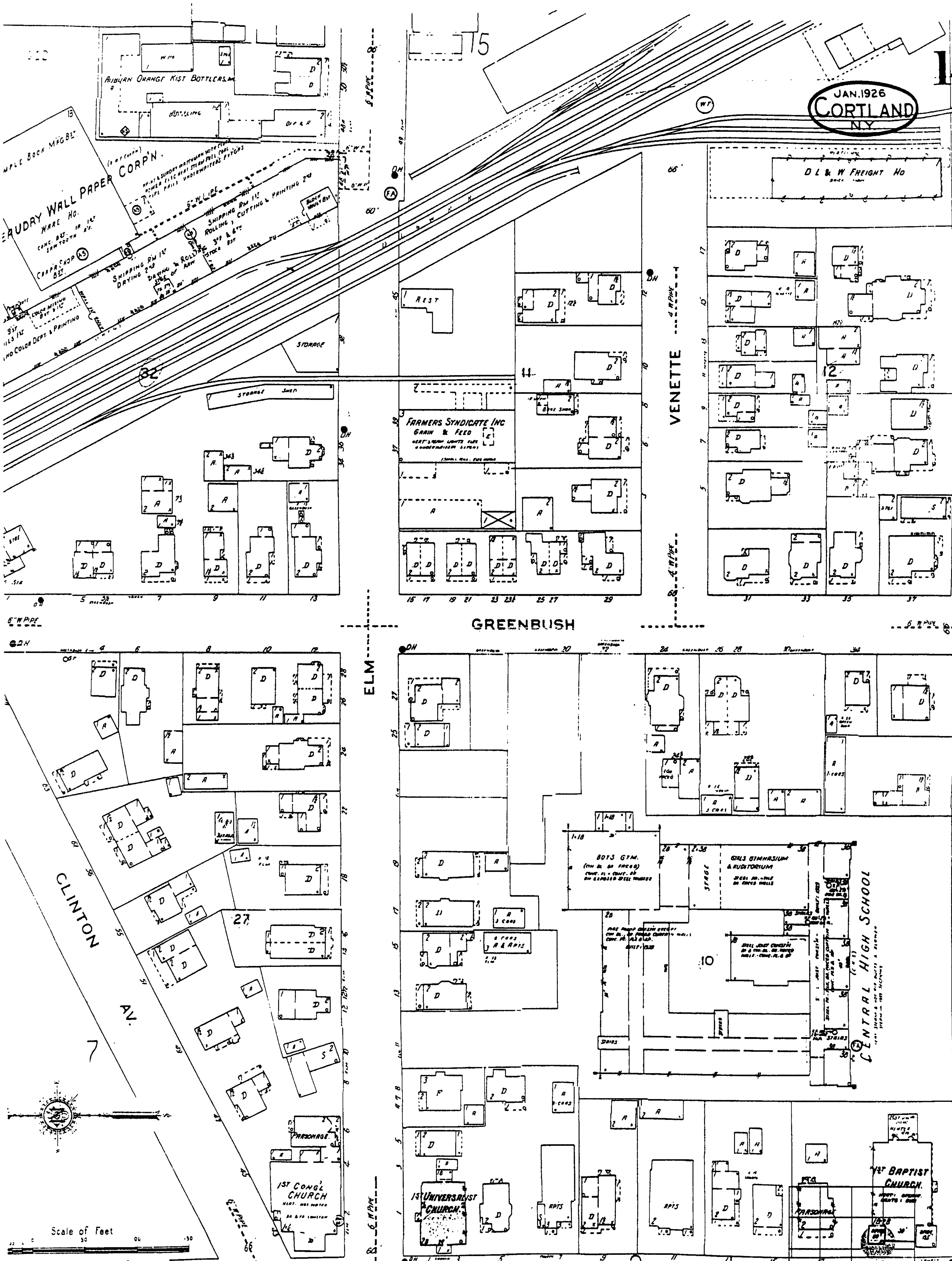
1971


JAN. 1926
CORTLAND
N.Y.
BROCKWAY MOTOR TRUCK CO. INC.
BROCKWAY MOTOR TRUCK CO., INC.
TEST & ADJUSTMENT BLDG.
CONOLITE CORPN
MFRS CONOLITE BURIAL CASES
CORTLAND CORSET CO INC
MAXON & STARIN
COAL POCKETS
PENDLETON
E. COURT
ACME COAL CO
HIDES, SKINS FURS & WOOL STORAGE
FILLING STA
THE F. H. COBB CO. WHOL. GROCERIES
CITIES SERVICE OIL CO.
OIL WARE HO
COAL SHED
LUMBER SHED
CENTRAL AV. (RAILROAD)
PORT WATSON
ST. CHARLES HOTEL
FEED GRAIN & SEEDS
CONC VAULT W HO
CORTLAND G.L.F. SERVICE, INC
FEED, GRAIN & FARM SUPPLIES
MIXING GRINDING & STGE
MAXON & STARIN
ROOFING, CEMENT & WALL BOARD
LUMBER SHED
WOOD WORKING & UPHOLSTERING
PRINT MIXING
DRY NURSERY
1ST CHURCH OF CHRIST, SCIENTIST
GREENBUSH
19
40
33
28
29
30
18
15
17
Scale of Feet

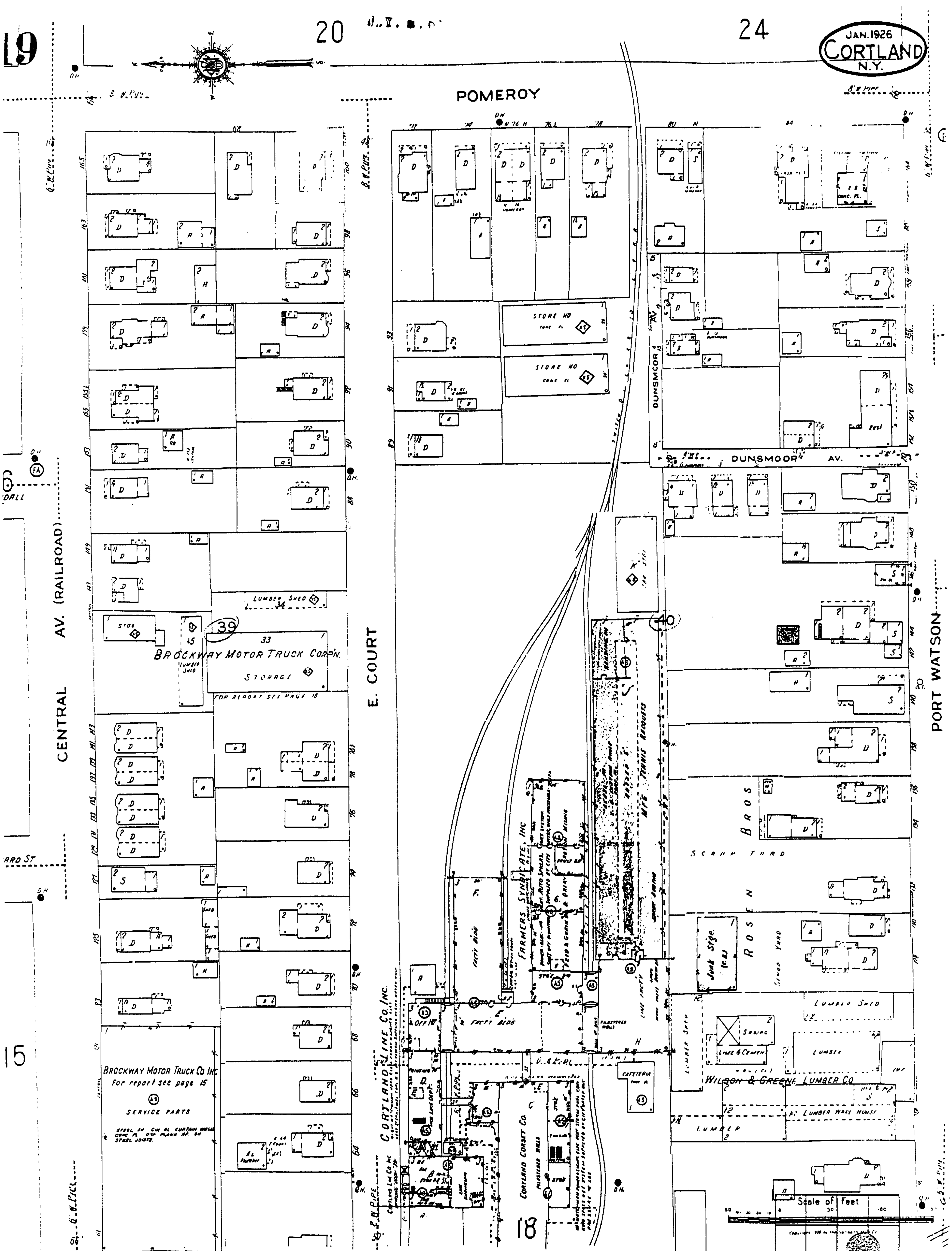
1946


5
GARFIELD
ELM
PENDLETON
HUBBARD
CENTRAL AV. (RAILROAD)
32
35
33
34
18
19
MOTOR TRUCK CO. INC
CHRYSTAL ICE CO
SERVICE EQUIPT BLDG.
MACHINE SHOP
REPAIR SHOP
SPRAY PAINTING
ASSEMBLY BUILDING
SHIPPING
LOCKER RM.
CAB ASSEMBLY
STORAGE
OFFICES
BODY PLANT
BROCKWAY
D.L.&W. R.R. DEPOT
Scale of Feet

1946


JAN. 1926
CORTLAND
N.Y.
GREENBUSH
ELM
VENETTE
CLINTON AV.
CHURCH
D L & W FREIGHT Ho
FARMERS SYNDICATE INC
GRAIN & FEED
AUBURN ORANGE KIST BOTTLERS
BEAUDRY WALL PAPER CORP'N.
CENTRAL HIGH SCHOOL
BOYS GYM.
GIRLS GYMNASIUM & AUDITORIUM
1ST CONG'L CHURCH
PARSONAGE
1ST UNIVERSALIST CHURCH
1ST BAPTIST CHURCH
STORAGE SHED
STORAGE
REST
Scale of Feet

1946

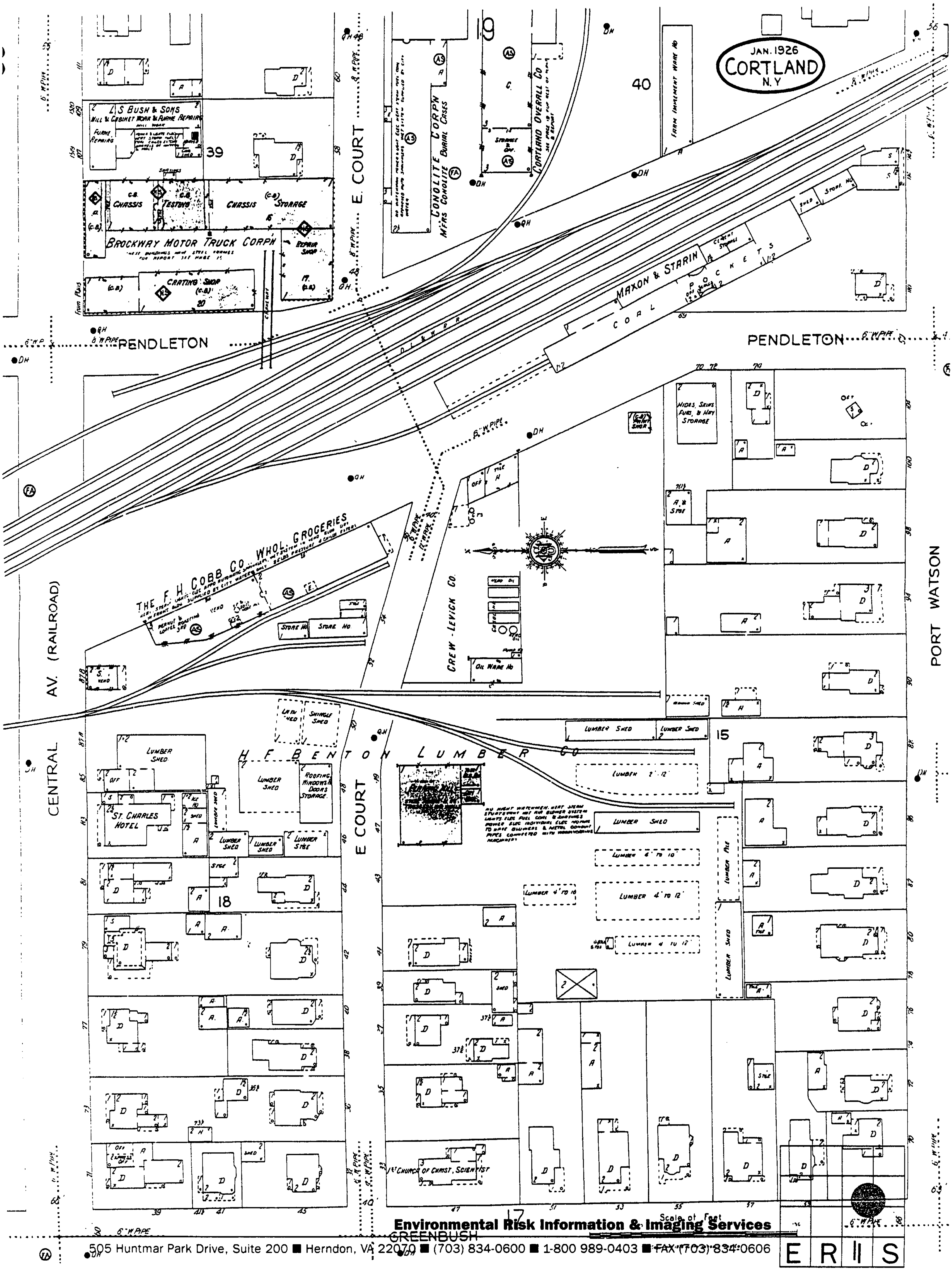


Environmental Risk Information & Imaging Services

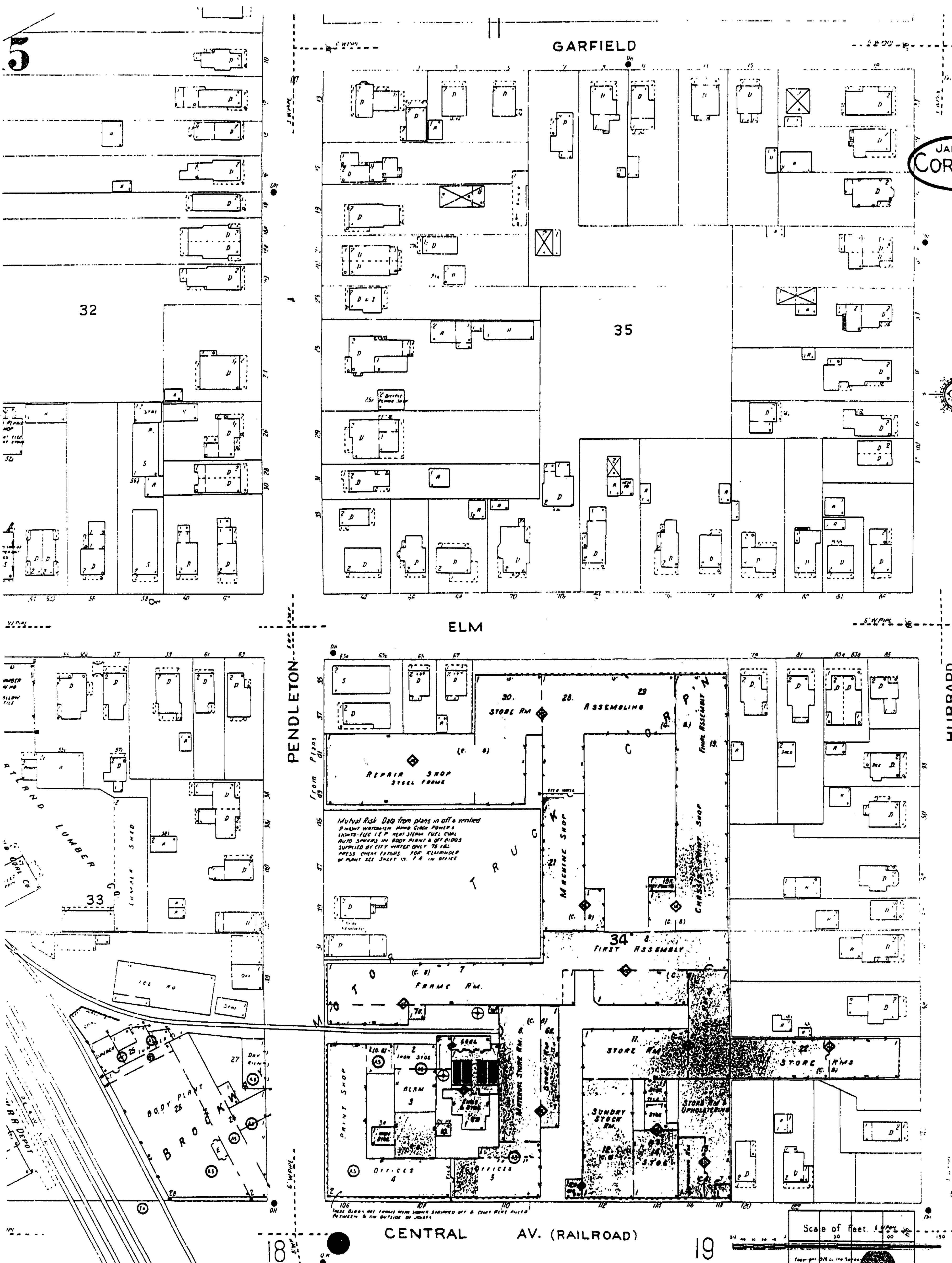
505 Huntmar Park Drive, Suite 200 ■ Herndon, VA 22070 ■ (703) 834-0600 ■ 1-800 989-0403 ■ FAX (703) 834-0606

ERIS

1946


JAN. 1926
CORTLAND
N.Y.
19
40
39
18
15
17
PENDLETON
E. COURT
PORT WATSON
CENTRAL AV. (RAILROAD)
GREENBUSH
L. S. BUSH & SONS
BROCKWAY MOTOR TRUCK CORPN
CHASSIS
TESTING
CHASSIS STORAGE
CRATING SHOP
REPAIR SHOP
CONOLITE CORPN
CORTLAND OVERALL CO.
FARM IMPLEMENT WARE HO
MAXON & STARIN
COAL POCKETS
CEMENT STORAGE
THE F. H. COBB CO. WHOL. GROCERIES
STORE HO
CREW-LEVICK CO.
OIL WARE HO
H. F. BENTON LUMBER CO
LUMBER SHED
ST. CHARLES HOTEL
ROOFING WINDOWS & DOORS STORAGE
SHINGLE SHED
LUMBER PILE
HIDES, SKINS FURS & WOOL STORAGE
1ST CHURCH OF CHRIST, SCIENTIST
6" W. PIPE
8" W. PIPE
Scale of Feet

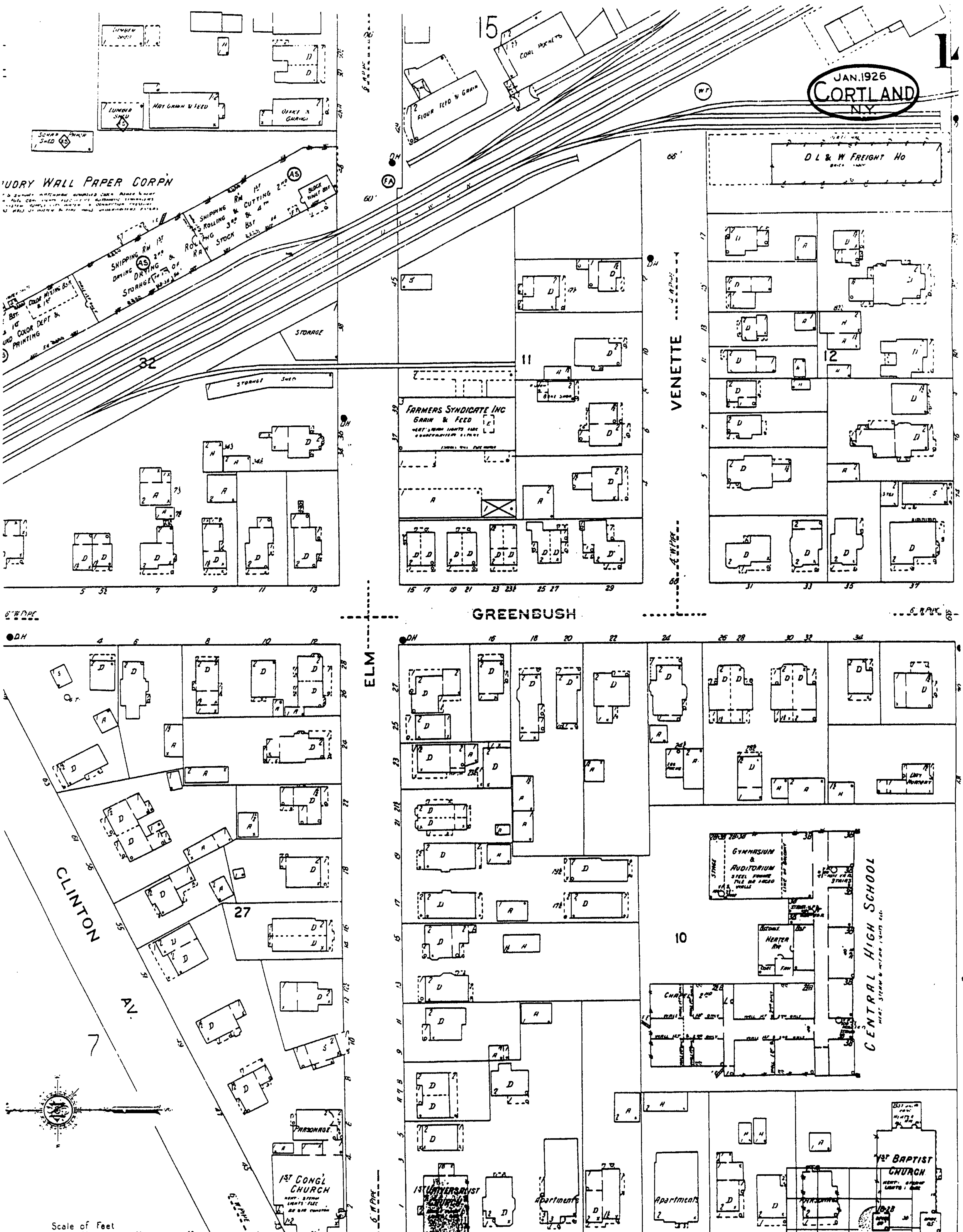
1926



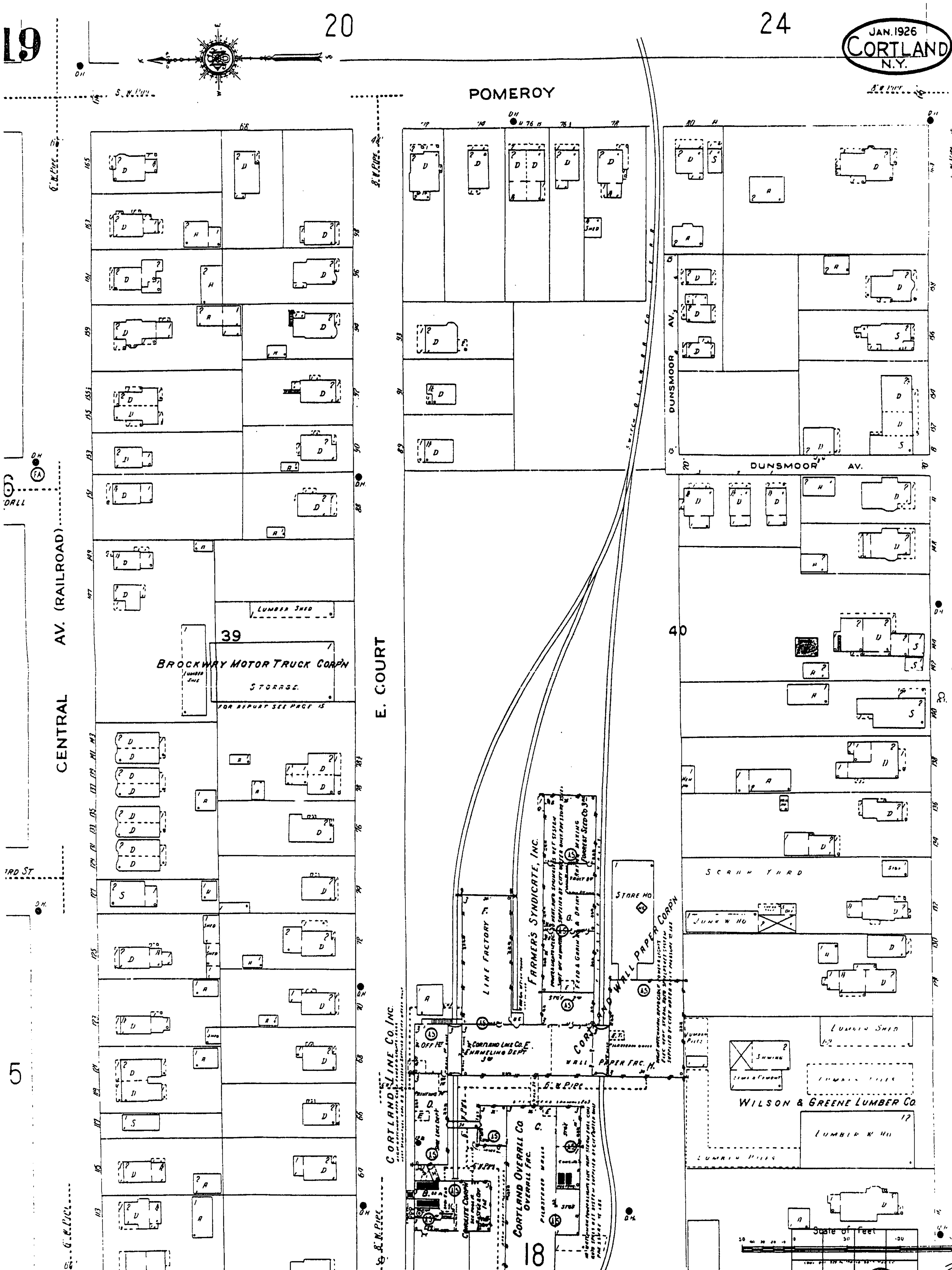
Environmental Risk Information & Imaging Services
505 Huntmar Park Drive, Suite 200 ■ Herndon, VA 22070 ■ (703) 834-0600 ■ 1-800 989-0403 ■ FAX (703) 834-0606

ERIS

1926


JAN. 1926
CORTLAND
N.Y.
15
COAL POCKETS
FLOUR FEED & GRAIN
HAY GRAIN & FEED
D L & W FREIGHT HO
WALL PAPER CORP'N
SHIPPING RM 1ST DRYING 2ND & STORAGE 3RD & 4TH
STORAGE
32
11
12
FARMERS SYNDICATE INC
GRAIN & FEED
VENETTE
GREENBUSH
ELM
CLINTON AV.
27
10
7
GYMNASIUM & AUDITORIUM
CHAPEL
CENTRAL HIGH SCHOOL
PARSONAGE
1ST CONG'L CHURCH
1ST UNIVERSALIST CHURCH
Apartments
Apartments
1ST BAPTIST CHURCH
Scale of Feet
CHURCH

1926

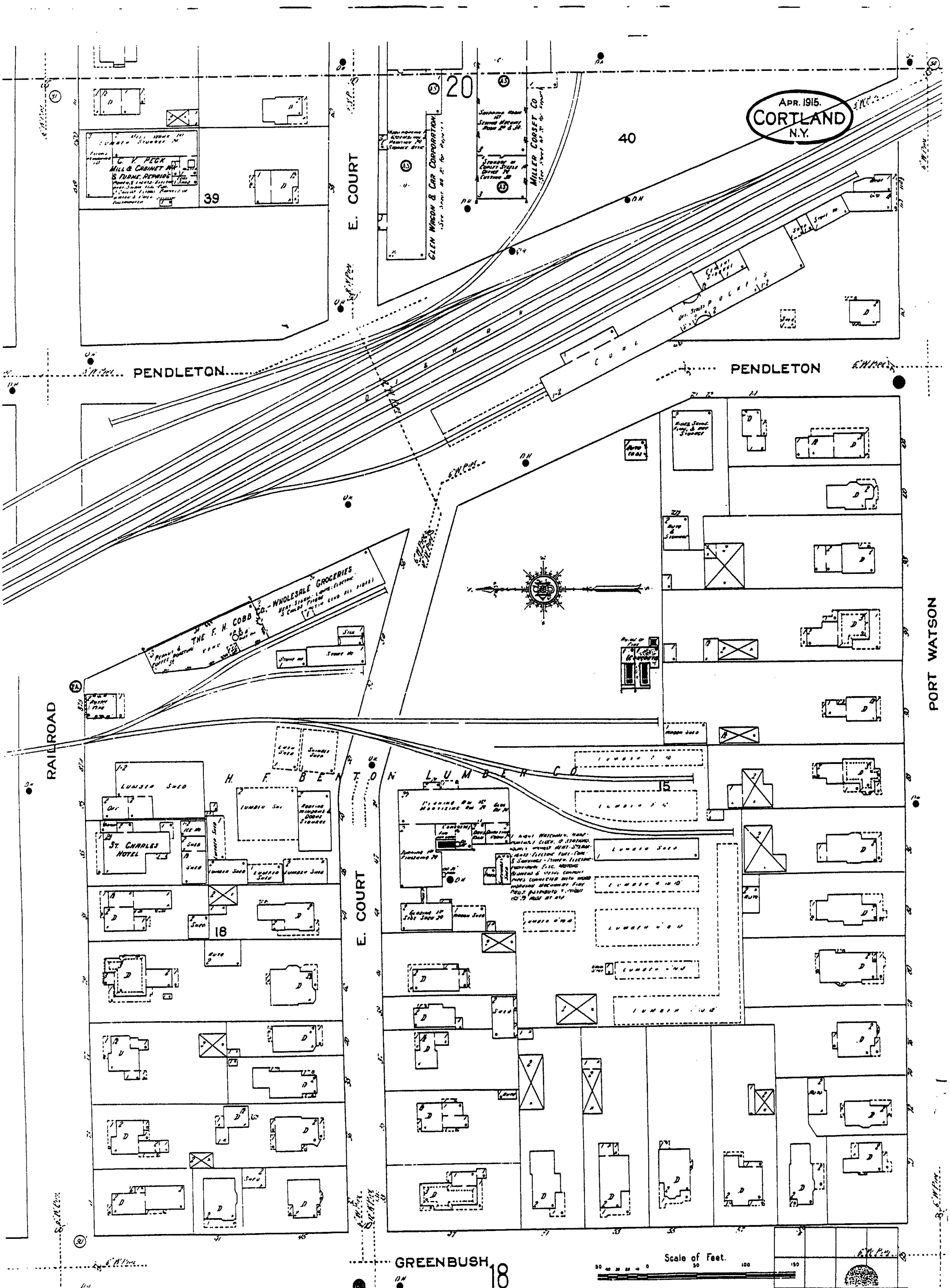


Environmental Risk Information & Imaging Services

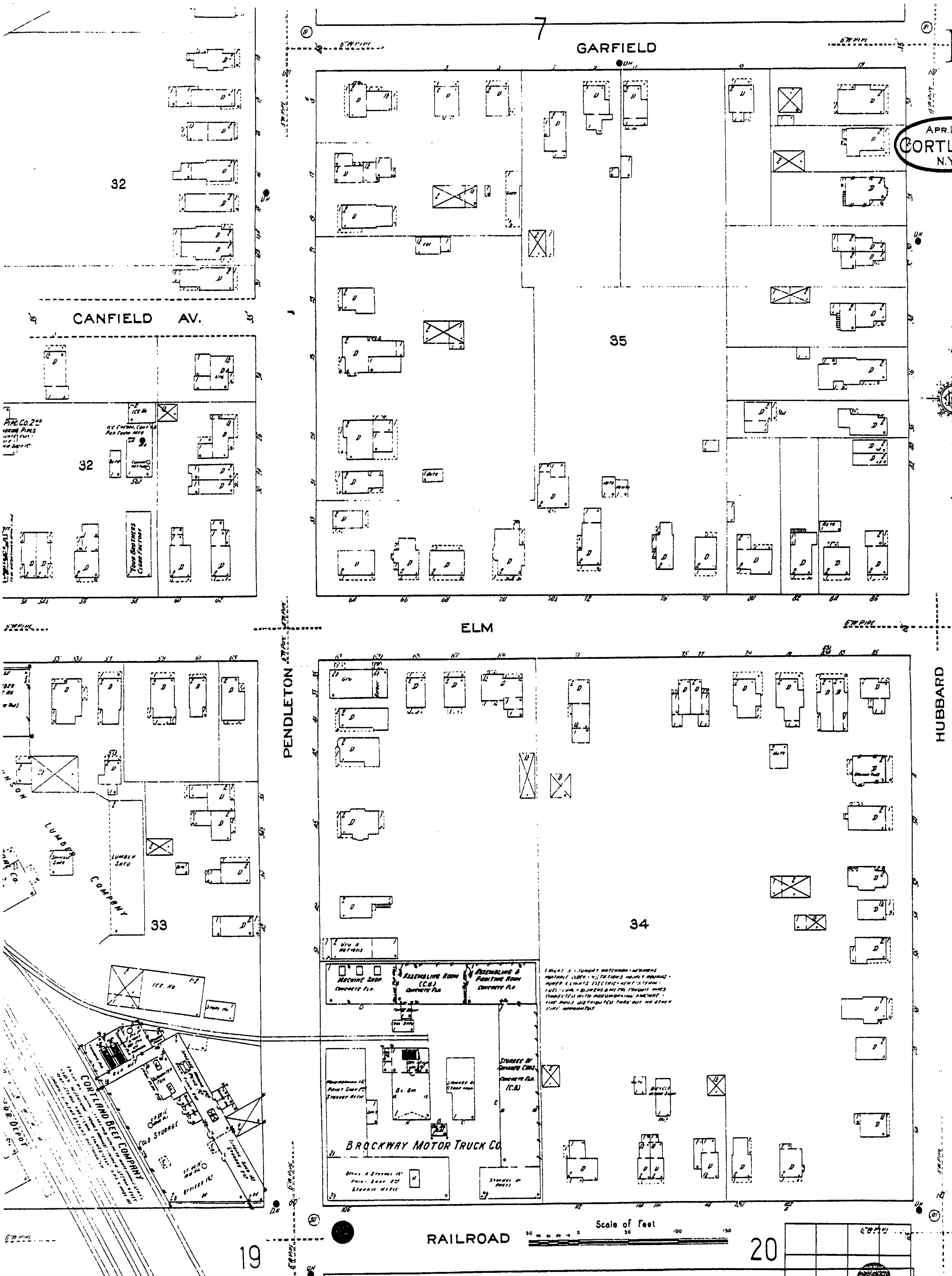
505 Huntmar Park Drive, Suite 200 ■ Herndon, VA 22070 ■ (703) 834-0600 ■ 1-800 989-0403 ■ FAX (703) 834-0606

E R I S

1926


APR. 1915.
CORTLAND
N.Y.
20
40
39
C. V. PECK
MILL & CABINET WK
& FURN. REPAIRS
GLEN WAGON & CAR CORPORATION
MILLER CORSET CO
E. COURT
PENDLETON
PENDLETON
COAL POCKETS
THE F. H. COBB CO. WHOLESALE GROCERIES
RAILROAD
PORT WATSON
H. F. BENTON LUMBER CO.
15
ST. CHARLES HOTEL
LUMBER SHED
18
E. COURT
GREENBUSH
18
Scale of Feet.

1915

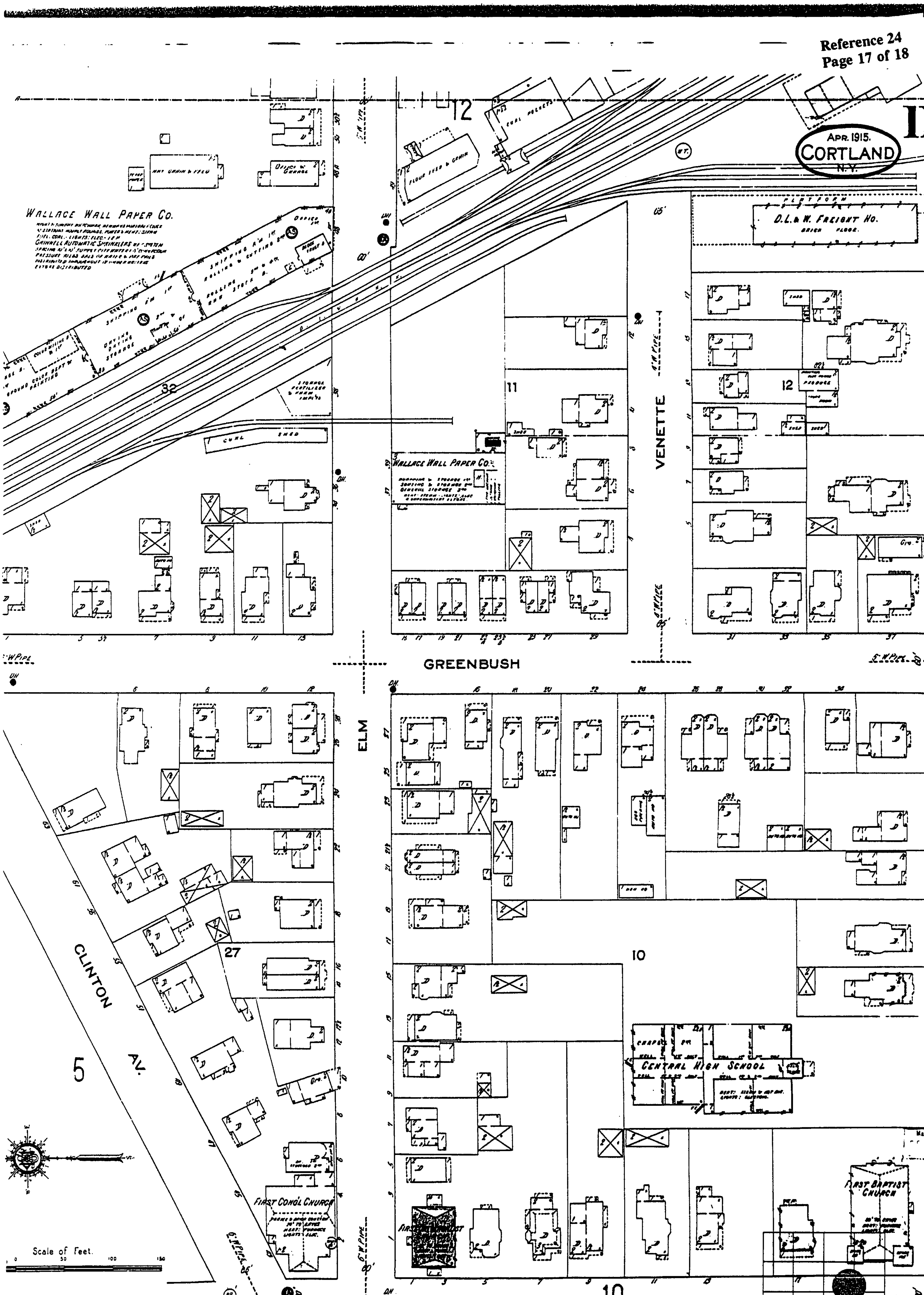


Environmental Risk Information & Imaging Services

505 Huntmar Park Drive, Suite 200 ■ Herndon, VA 22070 ■ (703) 834-0600 ■ 1-800 989-0403 ■ FAX (703) 834-0606

E R I S

1915

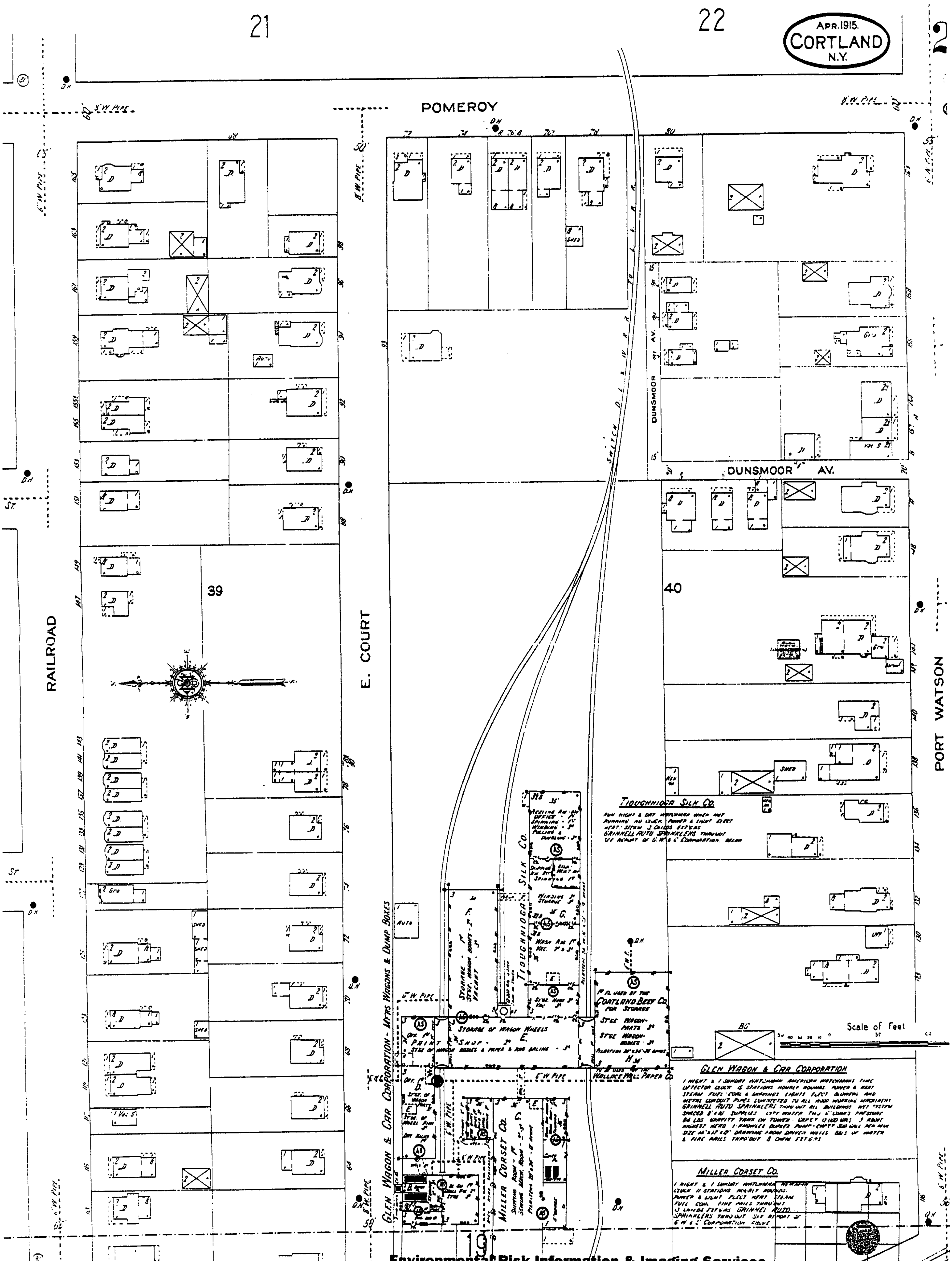


Environmental Risk Information & Imaging Services

505 Huntmar Park Drive, Suite 200 ■ Herndon, VA 22070 ■ (703) 834-0600 ■ 1-800 989-0403 ■ FAX (703) 834-0606

E R I S

1915


21
22
APR. 1915.
CORTLAND
N.Y.
POMEROY
DUNSMOOR AV.
DUNSMOOR AV.
RAILROAD
E. COURT
PORT WATSON
39
40
TIOUGHNIOGA SILK CO.
GLEN WAGON & CAR CORPORATION - MFRS WAGONS & DUMP BOXES
MILLER CORSET CO.
CORTLAND BEEF CO. FOR STORAGE
WALLACE WALL PAPER CO.
GLEN WAGON & CAR CORPORATION
MILLER CORSET CO.
Scale of Feet
19

1915

Reference 25

MACK TRUCKS, INC.

WORLD HEADQUARTERS
BOX M
ALLENTOWN, PENNSYLVANIA 18105-5000

Telephone: (610) 709-3011
Telecopier: (610) 709-2186

March 17, 1995

TELECOPY AND U.S. MAIL

Jeffrey L. Martin
Environmental Chemist
Ebasco Environmental
2111 Wilson Boulevard, Suite 435
Arlington, VA 22201-3058

Re: Brockway Motor Trucks in Cortland, N.Y.

Dear Mr. Martin:

As we discussed over the telephone on February 3, 1995, Mack Trucks received your correspondence regarding the request for additional information on an old Mack division plant facility, not owned or occupied by Mack Trucks since the late 1970's. Since that time, Mack Trucks, through its attorney and in-house personnel, has tried to contact the EPA official whose name and number you provided. We have left several messages on Ms. Moyik's phonemail, with no success in talking with her or receiving any return of our messages.

As we discussed, Mack Trucks is in no position to turn over any information without a confirmation of your status as well as that of the EPA's. We will continue to attempt contact with the EPA, but until then, we are left with no other alternative. We trust you appreciate our position.

As soon as satisfactory confirmation is made, we will contact you.

Very truly yours,

MACK TRUCKS, INC.

Thomas R. Wilcox

T. R. Wilcox, III
Attorney

Reference 26

Rubbermaid

CANFORD MANUFACTURING CORPORATION
Wholly Owned Subsidiary of Rubbermaid Incorporated

106 Central Avenue / Cortland, N.Y. 13045-2755
(607) 753-3305

July 23, 1987

Mr. John A. Ducar
NUS Corporation
1090 King Georges Post Road
Edison, NJ 08837

SUBJECT: Additional Requested Information for Site Inspection Report for Brockway Motor Truck EPA NY 980203111 Survey

Dear Mr. Ducar;

Per your letter dated July 13, 1987, to Mr. Ron Smith I'm attaching the additional information that you requested.

Please feel free to contact me if you need additional information concerning this matter.

Sincerely,

William G. Lewis
Facilities Engineer

WGL/dap

Attachment

1. Current employment at Rubbermaid-Cortland Inc. Facility as of July 15, 1987, is 295.

2. Rubbermaid-Cortland Inc. (An Affiliate of Rubbermaid Incorporated) U.S. EPA Number is NYD 057025777
   Issued: January 21, 1983
   Expiration: Permanent Permit

   Rubbermaid-Cortland Inc. Bulk Storage Facility Permit #810
   Issued: January 21, 1987
   Expiration: Permanent Permit

3. Storage/Disposal

   Store approximately 110 gallon/mo. in 55 gallon drums. Disposal of approximately 110 gallons/mo. or 1,110 lbs. in 55 gallon drums.

   Materials: 111, Trichloroethane Waste # *F002 UN 2831
   Materials: Petroleum Naphtha Waste # *D001 UN 1255

   *Recycle by scavengers

4. Name of transporters and scavengers:

   A. Solvents & Petroleum Services
      1405 Brewerton Rd.
      Syracuse, NY 13208

   B. Safety-Kleen Corporation
      Factory & Mitchell
      Matydale, NY 13211

   C. Environmental Oil Inc.
      P.O. Box 315
      Syracuse, NY 13209

5. Name of previous owner of properties prior to Rubbermaid's acquisition:

   a) North side of Central Avenue between Pendleton Street and Hubbard Street.

      Canford Manufacturing Corporation, a subsidiary of Stanhome Inc.

      (This property is being leased to Rubbermaid-Cortland Inc. by the owner, the Cortland County Industrial Development Agency.)

   b) North side of Central Avenue between Pendleton Street and Greenbush Street.

      New York, Susquehanna and Western Railway Corporation

c) North side of Central Avenue at the corner of Pendleton Street and Elm Street.

Paul A. Sepe and Georgianna T. Sepe.

d) South side of Central Avenue between East Court Street and Pomeroy Street.

Joseph Compagni, Jane Compagni and Joseph H. Compagni.

6. Number of tanks removed from site since Rubbermaid's acquisition.

7 tanks removed on or about mid-July 1985
1 tank removed on or about early October 1986
1 tank permanently closed on or about the end of Dec. 1986

9 total tanks removed or permanently closed since Rubbermaid's acquisition.

Reference 27


Metal On Steel
Misc. Metal Stge. Pallets Corr. Flats, Finished Plastic Products
A - A
Plastic Manufacturing
Paint Finishing
B - B
2Sto. Wd. Dwgs. For Several Hundred Feet Beyond
SCM CORP.
ELM STREET
6" C.W.M. 82 psi Direct Pumping With Overflow To Standpipe
From Grid
Insurance Boundary
4' Chain Link & Property Line
CAFE & BAR
DWG.
(1972) NEW ADD.
(1971) 5
Vacant Lot
STORE & DWG.
GARAGE
PENDLETON STREET (CLOSED)
HUBBARD STREET
2Sto. Wd. Dwgs. For Several Hundred Ft. Beyond
ERIE LACKAWANNA & WESTERN R.R.
R.R. Siding
Property Line
6' Chain Link & Property Line
Parking
(1945) 38
EXP.
EXPOSURE
Extruding
F - F
G - G
R.R. STATION
SEE DETAIL
Vacant Land For 100 Ft. Then 2Sto. Wd. & Bn. Mercantile Bldgs. For Several Hundred Ft. Beyond
(1981) 2
(1981) 3
(1971) 1
Offices
Truck Dock
COMP. RM.
Parking Lot
GAS METER HO.
CENTRAL AVENUE
Pumping Station
Offices
(1930) 28
(1943) 3
(1944) 32
ROTELCOM
(1930) 29
30
(1973) 42
Auto Parking
(1947) Q-4
(1947) Q-3
(1946-1947) Q-6
(1946-1947) Q-5
SHED
Wire Fence
Vacant Land For 50 Ft. Then 2Sto. Wd. Dwgs. For Several Hundred Feet Beyond
Vacant Land For 200 Ft. Then 2-3Sto. Br. & Wd. Mercantile Bldgs. For Several Hundred Ft. Beyond
Property Line
EAST COURT STREET
8" C.W.M.
To Pumping Station
Auto Parking
CORTLAND LINE CO.
HYDRAULIC DESIGN DATA

Reference 28

Reference 28
p. 1 of 1

EBASCO SERVICE INCORPORATED

TELECON NOTE

PROJECT: Brockway Motor Trucks

PROJECT NO. 8310.0076.0000.50042 | **DATE:** 6/22/95 | **TIME:** 1520

DISTRIBUTION: File

BETWEEN Peter Rynkiewitz | **OF:** Cortland County Health Dept. | **PHONE:** (607) 753-5035

AND: Jeff Martin

DISCUSSION:

Summary of Convesation.

Peter indicates there is no well head Protection areas for the local municipal wells, but they are working on establishing some.

Peter indicated the groundwater is known to be used for the water and processing of commerial diary cows. The Tioughnioga River is not known to be used as a source of water, except for Biningtom, ~ 30-40 miles downstream.

ACTION ITEMS:

EBASCO

Reference 29

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTI
01 STATE NY
02 D980203111

. SITE NAME AND LOCATION

SITE NAME (Legal, common, or descriptive name of site): Brockway Motor Trucks

02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: 106 Central Avenue

03 CITY: Cortland

04 STATE: NY | 05 ZIP CODE: 13045 | 06 COUNTY: Cortland | 07 COUNTY CODE: 023 | 08 CONG DIST.: 25

09 COORDINATES

LATITUDE: 4 2º 3 5" 3 0'. N
LONGITUDE: 0 7 6º 1 0" 3 0'. W

10 DIRECTIONS TO SITE (Starting from nearest public road)

erstate 81 to Cortland. Use Exit 11. Proceed east, past Holiday Inn, to third light (Central Avenue). Right on Central
out ½ mile to plant.

III. RESPONSIBLE PARTIES

OWNER (if known): Cortland County Industrial Development Agency

02 STREET (Business, mailing, residential): 50 Main Street

03 CITY: Cortland

04 STATE: NY | 05 ZIP CODE: 13045 | 06 TELEPHONE NUMBER:

OPERATOR (if known and different from owner): Rubbermaid, Inc.

08 STREET (Business, mailing, residential): 106 Central Avenue

09 CITY: Cortland

10 STATE: NY | 11 ZIP CODE: 13045 | 12 TELEPHONE NUMBER: (607) 753-3305

13 TYPE OF OWNERSHIP (Check one)

___ A. PRIVATE ___ B. FEDERAL: ________ (Agency name) ___ C. STATE X D. COUNTY ___ E. MUNICIPAL

___ F. OTHER: ________ (Specify) ___ G. UNKNOWN

14. OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

___ A. RCRA 3001 DATE RECEIVED: / / X B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: 06/08/81

___ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

ON SITE INSPECTION

X YES DATE: 12 / 16 / 82

NO

BY (Check all that apply)

___ A. EPA ___ B. EPA CONTRACTOR X C. STATE ___ D. OTHER CONTRACTOR

X E. LOCAL HEALTH OFFICIAL ___ F. OTHER: ________ (Specify)

CONTRACTOR NAME(S): ________

02 SITE STATUS (Check one)

X A. ACTIVE ___ B. INACTIVE ___ C. UNKNOWN

03 YEARS OF OPERATION

1969 (BEGINNING) Present (ENDING) ___ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

The presence of inorganics, solvents, heavy metals, acids and bases are possible, due to their use at the plant in the past.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

A potential hazard exists to surface water, groundwater, and soil contamination. The population in the area uses groundwater for drinking.

IV. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste information and Part 3 - Description of Hazardous Conditions and Incidents)

___ A. HIGH (Inspection required promptly)

X B. MEDIUM (Inspection required)

___ C. LOW (Inspection on time available basis)

___ D. NONE (No further action needed. complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT: iana Messina

02 OF (Agency/Organization): U.S. EPA Region II, Edison, NJ

03 TELEPHONE NUMBER: (201) 321-6776

04 PERSON RESPONSIBLE FOR ASSESSMENT: ohn Ducar

05 AGENCY: EPA

06 ORGANIZATION: NUS FIT II

07 TELEPHONE NUMBER: (201) 225-6160

08 DATE: 02 / 24/ 87

NUS CORPORATION
A Halliburton Company

02-8701-22-PA

POTENTIAL HAZARDOUS WASTE SITE

PRELIMINARY ASSESSMENT

COMPLETED

Brockway Motor Trucks
Site Name

NYD980203111
EPA Site ID Number

106 Central Avenue
Cortland, New York
Address

02-8701-22
TDD Number

Date of Site Visit: 02/04/87

SITE DESCRIPTION

Brockway Motor Trucks is a 22-acre site that was owned by Mack Trucks, Inc. and used as a truck assembly plant. The facility is located in a residential area at 106 Central Avenue in Cortland, New York. The former factory building is currently owned by the Cortland County Industrial Development Agency and is leased by Rubbermaid, Inc. to manufacture and distribute plastic products. The former office building across the street is owned by Canford Mfg. The NYDEC removed two tanks containing solvents from the property now occupied by Rubbermaid. There is still an unknown number of drums in a fenced area next to the Canford Mfg. building.

PRIORITY FOR FURTHER ACTION: High ___ Medium X Low ___

RECOMMENDATIONS

A site inspection is recommended. The potential for contamination of groundwater, surface water, soil and the sanitary sewer system warrants sampling.

Prepared by: John A. Ducar
of NUS Corporation

Date: 02/24/87

Reference 30

02-8704-17-SR
Rev. No. 0

SUMMARY STATEMENT
BROCKWAY MOTOR TRUCKS

Brockway Motor Trucks is a 20.5-acre site that was owned by Mack Trucks, Inc. and used as a truck assembly plant from 1969 to 1977. The facility is located in a moderately populated commercial/residential area on Central Avenue in Cortland, New York. The former truck factory building is currently owned by the Cortland County Industrial Development Agency and leased by Rubbermaid Inc. (1983 - Present) to manufacture and distribute plastic products.

In February 1987, a 55-gallon drum of 1,1,1-trichloroethane (TCE) was crushed by a forklift, allowing approximately 35 gallons of the solvent to spill onto the ground. The NYSDEC was at the site the same day to oversee the excavation and removal of the contaminate soil. Soil analysis showed the presence of 1,1,1-TCE.

The primary concern at this site is the potential contamination of the drinking water aquifer. Residents within the city limits of Cortland obtain their drinking water from a municipal supply system. The municipal water supply is obtained from two wells located west of the site in the city of Cortland. The potential population affected within a 3-mile radius is 24,851.

This report will not deal with formerly buried diesel and gasoline fuel tanks because they are not covered under CERCLA. It is recommended that further investigation be conducted in this area.

Results of sampling at the site showed lead in concentrations over five times greater in the downgradient well than in the upgradient well. Aluminum, barium, chromium, copper, magnesium, and vanadium were also detected in concentrations significally greater in the downgradient well.

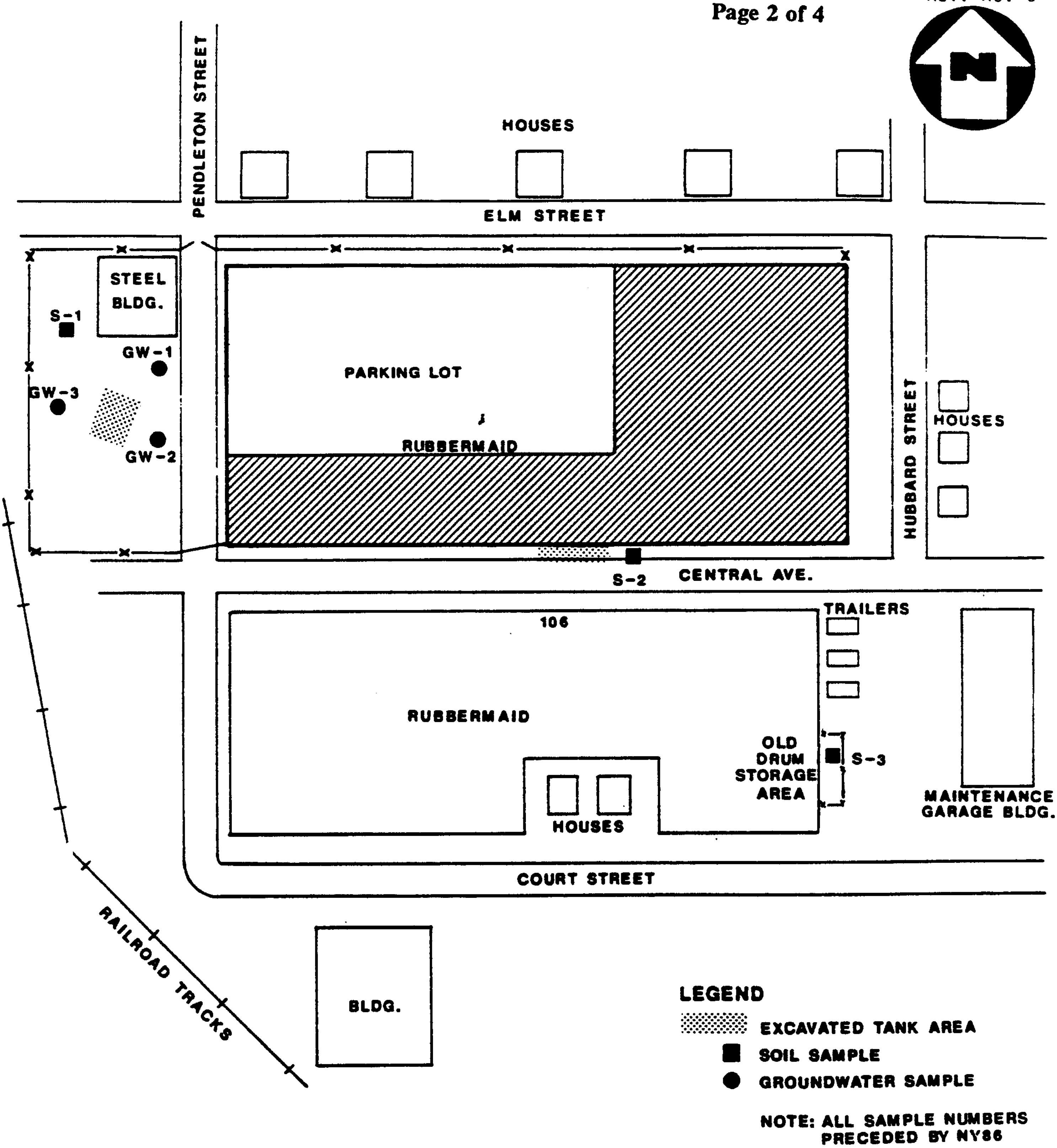


FIGURE 3

NUS CORPORATION

SAMPLE LOCATION MAP

BROCKWAY MOTOR TRUCKS, CORTLAND, N.Y.

(NOT TO SCALE)

BROCKWAY MOTOR TRUCKS, CORTLAND, NEW YORK

1P-7 July 8, 1987 1445
J. Murtaugh and T. Varner taking sample GW-3.
Photographer: John Ducar.

1P-8 July 8, 1987 1545
J. Murtaugh taking sample S-1.
Photographer: John Ducar.

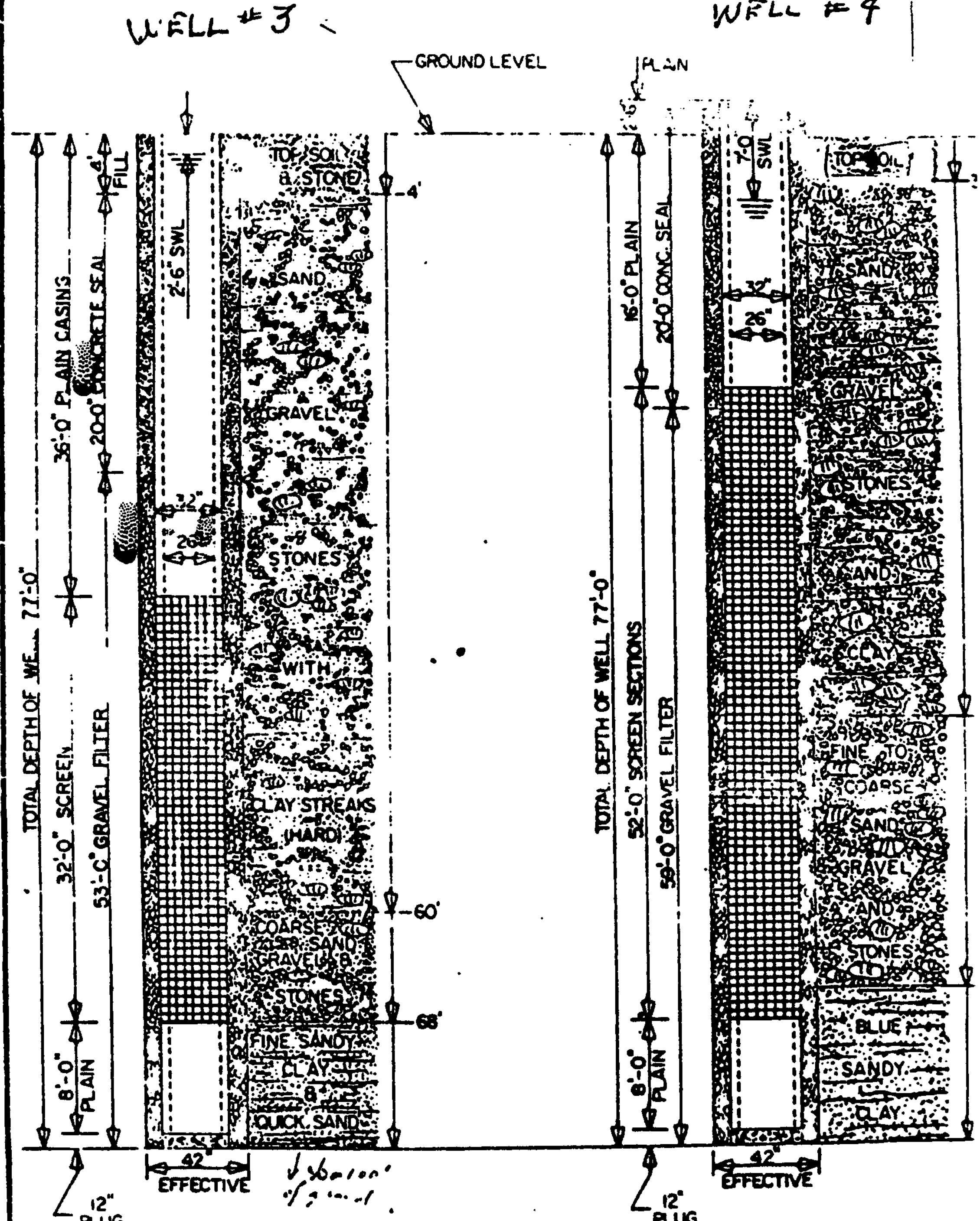
BROCKWAY MOTOR TRUCKS, CORTLAND, NEW YORK

1P-9 July 8, 1987 1630
T. Varner taking sample S-2.
Photographer: John Ducar.

1P-10 July 8, 1987 1645
T. Varner taking sample S-3.
Photographer: John Ducar.

Reference 31

KELLY CONCRETE WE
INSTALLED FOR
CITY OF CORTLAND, NEW YOR
MARCH 1949 MARCH 1957



LOCATION: END OF ELLWOOD AVE
500' NW OF OLD WELL
PUMPED 2900 GPM 14'-09" DRAWDOWN

LOCATION: ON TEST HOLE NUMBER 3
PUMPED 2260 GPM 5'-6" DRAWDOWN
Deep WELL NO. 2-57

. . . . . ., INC.

WELL LOG

Starting Date 21 Aug 75
Completed 12 Sep 75

ell No. 3 (Hall #1)

Job name and address Town of Cortlandville

etailed location

Engineer Rowell Associates Report to

rilling Instructions As per Contract

Static	Well Dia.	Depth	Material
9'4" BTC	12"	0-6"	Topsoil
		6"-30'	Dry Gravel, Sand & Boulders
		30-63'	Coarse Sand & Gravel, Water-bearing
		63-65'	Water-bearing Sand & Gravel with Clay
		65-70'	Glacial Till, dense, no water

Left-in-place, 50' of 12" welded casing
15' of 12" Johnson telescoping S/S well screen, 100 slot, lead packer top, closed bottom

Pumped 26 hours @ 660 GPM, pumping level 45' BTC. Casing terminated 12" above grade. Top of screen at 49' below grade(actual elevation of bottom of 12" casing).

Screen data per above notes.
creen Size Setting Exposure

R. Rowe
Driller

RANDOLPH WELL & PUMP CO., INC.

[redacted]

McLean, New York

Invoice No.

Owner's Name Town of Cortlandville Address Lime Hollow Rd. (site) Cortland, NY

Contract No. Size of Well 6 inch Mach. No. Driller

Type G.P.M. Draw Down Total Depth in Feet

Date Started 12-29-87 Date Completed 2-16-88

CASING IN FEET	ROCK DRILLED	GASOLINE IN GALS.	FORMATION AND REMARKS
			69ft. - Gravel (some fine sand)
			70 - 71 - Gravel (mostly Sand)
			72 - hard packed sand- (fine & coarse stones)
			73 - Sand (some stones)
			74 - Gravel & Sand (some fine)
			75 - Coarse Sand & Gravel
			75 - bailed 20 gpm
			76 - Coarse Sand & Gravel
			77 - Coarse Snad (some gravel)
			78 - Sand (some hardpan on bit)
			79 - 80 - Sand -(fine to coarse - some stones)
			81 - Sand (fine to coarse)
			82 - Fine ~~Snad~~ sand & Gravel
			83 - Gravel & Sand
			84 - 85 - Gravel
			85 - 86 -Gravel & Sand
			86-90 - Gravel & Coarse Sand
			90 - 91 - Quick Sand & Clay

REMARKS:

.III

RANDOLPH WELL & PUMP CO., INC.

[redacted]

McLean, N. Y.

DRILLER'S LOG

Invoice No.

Owner's Name Town of Cortlandville

Address Lime Hollow Rd., Cortland, N. Y.

Contract No.

Size of Well 6 inch

Mach. No.

Driller

Type

G.P.M.

Draw Down

Total Depth in Feet

Date Started 2-9-88

Date Completed 2-10-88

CASING IN FEET	ROCK DRILLED	GASOLINE IN GALS.	FORMATION AND REMARKS
			Development
			2-9-88 ....4½ Hrs.
			2-10-88 ....8½ Hrs.
			Static Water Level 32 ft. 6 inches

REMARKS:

STEWART BROS., INC.
Schenectady, N.Y.

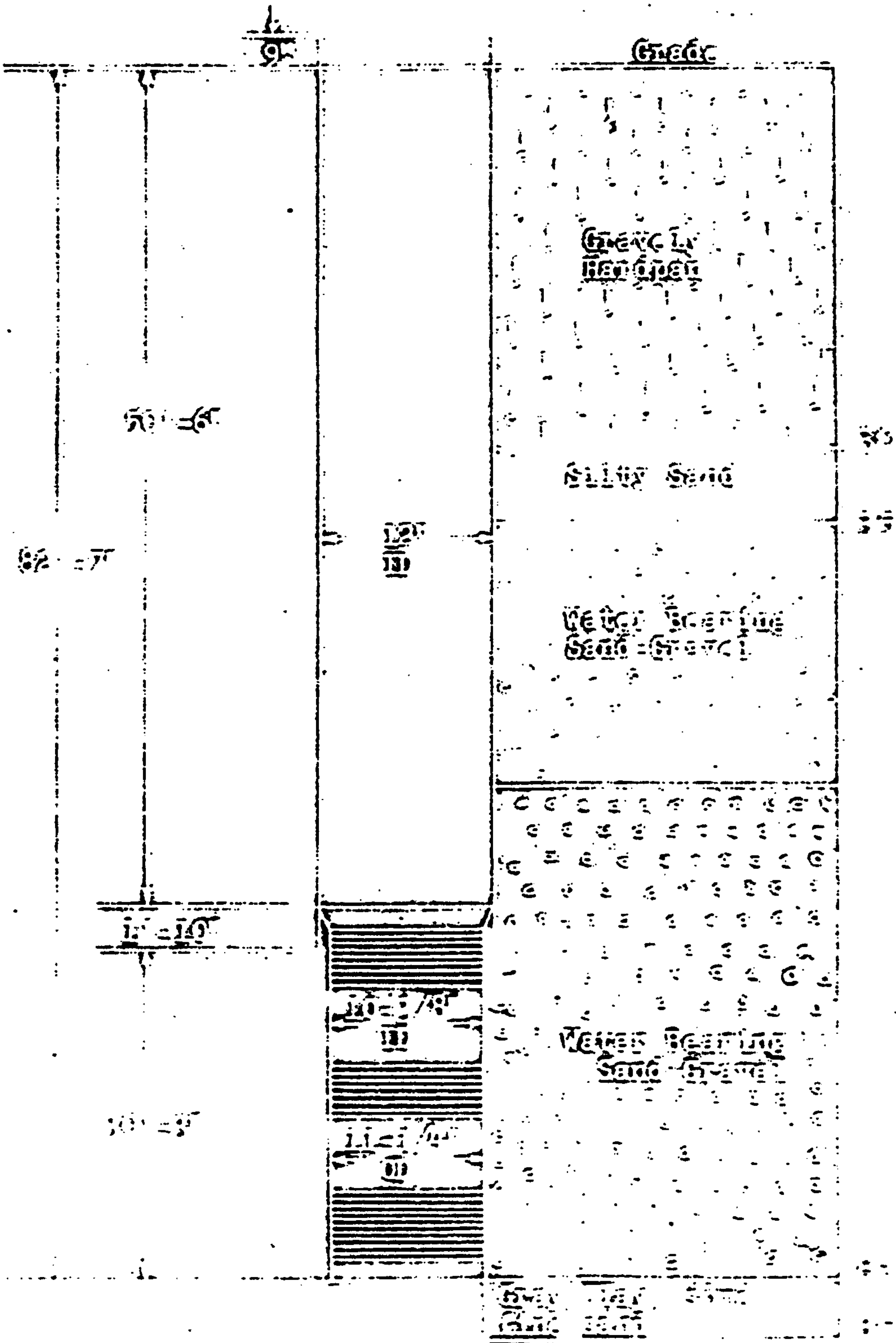
Industrial and Municipal Well Water Work

Dec. 22, 1965

WELL LOG

VILLAGE OF HOMER, N.Y.

Figure II



TYPE WELL

Single Cased
Screened Natural
Gravel Filter Well.

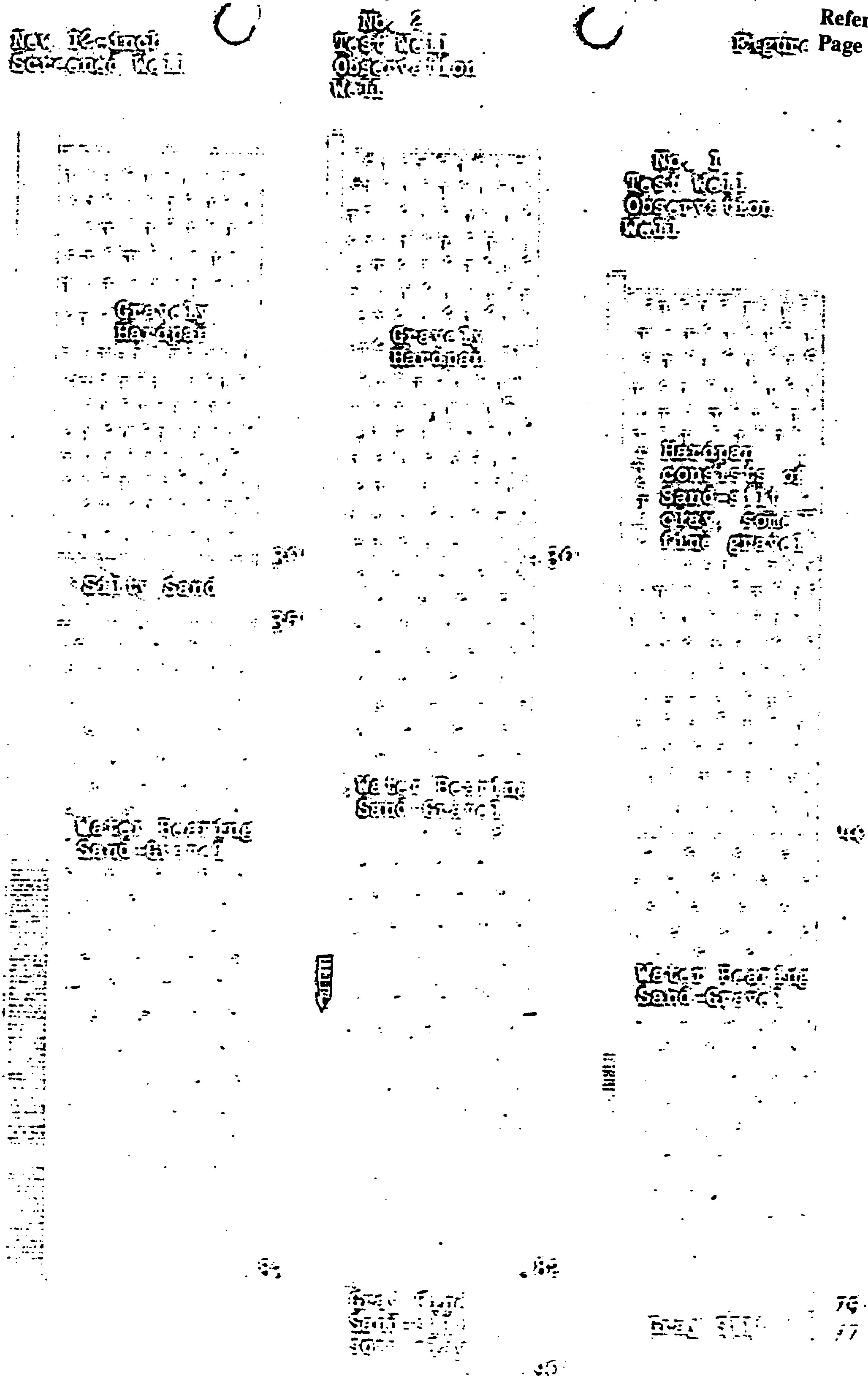
SCREEN

Mfg. E.E. Johnson Inc.
Alloy Everdur
Size 12" Nominal
Length 32'-0"
Slot Size
Top 1 Ft. Tight Slot
Next 5 Ft. #30 Slot
Next 17 Ft. #40 Slot
Next 7 Ft. #20 Slot
Next 3 Ft. #60 Slot
Attachments Std.

STATIC LEVEL - [illegible]

PUMPING TEST

Date Dec. 21-22, 1965
Pumping Rate [illegible]
Draw Down [illegible]
Pumping Level [illegible]
Draw Down [illegible]
Test Duration [illegible]
Test Pump [illegible]


No. 2
Test Well
Observation
Well
No. 1
Test Well
Observation
Well
Gravelly
Hardpan
Gravelly
Hardpan
Hardpan
consists of
Sand-silt,
clay, some
fine gravel
Silty Sand
Water Bearing
Sand-Gravel
Water Bearing
Sand-Gravel
Water Bearing
Sand-Gravel
75
77

JOB LOCATION: VILLAGE OF MCGRAW -Bennett [illegible]
PROJECT ENGINEERS: Resource Engineering ; #8523
DATES: August 13 TO December 13, 1985
DRILL SUP'T: Daniel Mowers

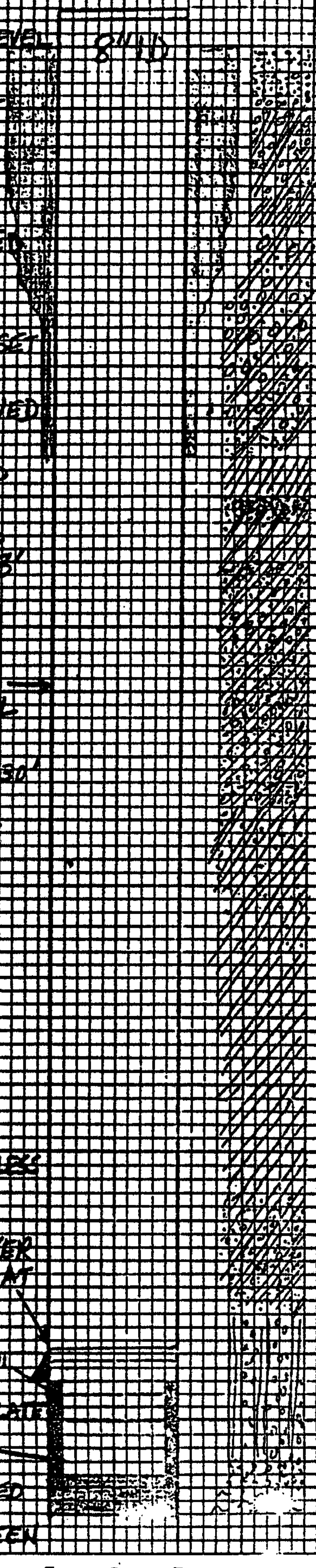
WELL SKETCH

DEPTH IN FEET

0	EXISTING GROUND LEVEL	SAND
	STATIC WATER LEVEL IS +12' OVER FLOWING	SAND & GRAVEL
10'		COARSE GRAVEL, WATER
	MUD ROTARY DRILLED OVERSIZE 12" to 46' & GROUTED	CLAY & STONEY TILL
20		
		CLAY
30	NO SAMPLES REQUIRED	
	LOST CIRCULATION at 10' & 24'	GLACIAL TILL WITH LARGE ROCKS
40		
	TEMPORARY 12" CASING SET TO 20'	
50		
	NO DRILLINGS RETURNED TO SURFACE TO 46'	
60		
	SWITCHED TO 10" AND DRILLED TO 63'	GLACIAL TILL
70		HARD PACKED GRAVEL
	SET 8" STEEL AND DRILLED TO 223'	GRAVEL WITH CLAY, LITTLE WATER, STATIC LEVEL 8'
80		GRAVEL, LARGE STONES, CLAY, RISES UP, LEVEL 6'2"
		HARDPAN TILL
90		CLAY, LARGE STONES, VERY LITTLE WATER
	8" CASING SCHD 40 STEEL BE WELDED BOTTOM 130'	LOOSE CLAY, FINE SAND
100		STATIC LEVEL +1' OVER FLOWING
		CLAY, SAND, LARGE STONES
110		
	T&C & WELDED TOP 74'	
120		HARDPAN, NO WATER - DRY, AIR ROTARY DRILLED, VERY DENSE; AIR DOES MAKE SOME WATER
		CLAY TILL, FEW STONES VERY LITTLE WATER
130		
140		SOFT GUMBO CLAY TILL, NO WATER
150		
160		
170	ALL JOINTS ON SCREEN WELDED WITH STAINLESS STEEL RODS	
180		CLAY & SAND
	FIGURE K RUBBER PACKER WITH 30" OF 7" CASING AT TOP OF SCREEN	SAND, SOME GRAVEL, CLAY, SWL IS 8'
190		SAND GRAVEL CLAY LAYERS, LARGE STONES WATER BEARING SWL 2'
		FINE SAND, SILT, CLAY
	10' OF 45 SLOT STAINLESS STEEL TELESCOPE JOHNSON WELL SCREEN 8"	LARGE CEMENTED STONES, GRAVEL, CLAY BALLS SWL 3' CEMENTED GRAVEL
200		CLAY GRAVEL, HARDPAN, COARSE SAND UNDER PRESSURE +10' SWL +6'
	2' OF 6" CASING WITH PLATE BOTTOM AS A SUPPLEMENT	CLAY, SHALE, HARDPAN, GRAVEL
210		
		GRAVEL HARDPAN SHALE
220	BOTTOM OF WELL FILLED IN TO 211' BEFORE SETTING WELL SCREEN	FRACTURED ROCK WITH SOME GRAVEL, LIMESTONE & SHALE 10GPM
223'		
230		

202
212

8" ID



SHOP DRAWING
"NOT TO SCALE"
A. W. KINCAID INC.
William H. Yorton [signature]
William H. Yorton, Pres.
National Water Well Assn.
Certified # 1622
315 697-7720
315 687-3421

1 2 3 4 5 6 7 10 11 12 13 14 15 16 17 18

ben

CITADEL® NO 639 - SCIENCE - 5 SQUARES [illegible] LINES

WOITTinc TEST BORING LOG EAST SYRACUSE, N.Y. 13057

Reference 31
Page 8 of 8

PROJECT Bennett Street Well Site
LOCATION McGraw, New York
DATE STARTED 9/1/93 DATE COMPLETED 9/1/93

HOLE NO. B-1
SURF. EL.
JOB NO. 93248
GROUND WATER DEPTH
WHILE DRILLING 10.0'
BEFORE CASING REMOVED 12.4'
AFTER CASING REMOVED Hole caved at 2.5'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
5.0							
	5.0'-	1		24/20		Brown dry hard SILT, some fine to	
	7.0'			23/20	43	coarse gravel, little fine to coarse	
						sand	
10.0							10.0'
WL	10.0'-	2		11/6		Brown wet medium dense fine to coarse	
	12.0'			6/7	12	SAND, some fine to coarse gravel,	
	12.0'-	3		7/10		trace silt	
	14.0'			10/14	20		14.0'
15.0	14.0'-	4		12/29		Brown wet very dense fine to coarse	
	16.0'			12/7	41	SAND, some fine to coarse gravel,	
	16.0'-	5		11/10		little silt	16.0'
	18.0'			5/4	15	Brown wet medium dense fine to coarse	
	18.0'-	6		9/6		SAND and fine to coarse GRAVEL,	
20.0	20.0'			9/7	15	trace silt	19.0'
	20.0'-	7		7/7		Gray-brown moist stiff SILT, some	
	22.0'			7/7	14	clay, trace fine sand	
						Bottom of Boring	22.0'
25.0							

Reference 32

Department of Environmental Conservation

Division of Water

New York State Water Quality 1994

Submitted Pursuant to Section 305(b) of the Federal Clean Water Act

June 1994

New York State Department of Environmental Conservation
MARIO M. CUOMO, *Governor* LANGDON MARSH, *Commissioner*

DRAINAGE BASIN: Susquehanna River

Sub-Basin: Chenango-Tioughnioga Rivers

SEGMENT NAME	SEG ID	COUNTY	SEGMENT TYPE	SEGMENT SIZE	CLASS	PRIMARY USE IMPAIRED	SEVERITY	PRIMARY POLLUTANT	PRIMARY SOURCE
BALLYHACK CREEK	0602-0034	Broome	River	3.0 Mi.	C	Fish Propagation	Stressed	Silt (Sediment)	Construction
BRAKEL CREEK	0602-0046	Cortland	River	2.0 Mi.	C,CT	Fish Propagation	Stressed	Silt (Sediment)	Agriculture
BRAKEL CREEK	0602-0049	Chenango	River	8.0 Mi.	C,C(T)	Fish Propagation	Stressed	Silt (Sediment)	Agriculture
BROOKS CREEK	0602-0001	Broome	River	1.0 Mi.	D	Fish Survival	Precluded	Metals	Land Disposal
CANASAWACTA CREEK	0602-0013	Chenango	River	7.0 Mi.	B	Fish Propagation	Stressed	Silt (Sediment)	Hydromodification
CHENANGO RIVER	0602-0009	Chenango	River	45.0 Mi.	B,C,BT	Fish Propagation	Stressed	Nutrients	Municipal
CHENANGO RIVER	0602-0033	Broome	River	10.0 Mi.	B	Fish Propagation	Stressed	Nutrients	Agriculture
CHENANGO RIVER	0602-0050	Broome	River	1.0 Mi.	B	Fish Propagation	Stressed	Metals	CSO's
COLD BROOK	0602-0011	Chenango	River	3.0 Mi.	C(T)	Aesthetics	Stressed	Silt (Sediment)	Agriculture
DUDLEY CREEK	0602-0037	Broome	River	5.0 Mi.	C,C(T)	Fish Propagation	Stressed	Silt (Sediment)	Agriculture
E.BR.TIOUGHNIOGA	0602-0020	Cortland	River	20.0 Mi.	C(T)	Boating	Stressed	Silt (Sediment)	Agriculture
EATON BROOK RES.	0602-0041	Madison	Lake	35.0 A	B	Bathing	Threatened	Nutrients	On-site Systems
FABIUS BROOK	0602-0026	Onondaga	River	3.0 Mi.	C(T)	Fish Propagation	Threatened	Thermal Changes	Agriculture
FACTORY BROOK	0602-0025	Cortland	River	3.5 Mi.	C(TS)	Fish Survival	Threatened	Silt (Sediment)	Agriculture
FLY CREEK	0602-0012	Chenango	River	2.0 Mi.	C(T)	Aesthetics	Threatened	Nutrients	Agriculture
GORTON LAKE	0602-0040	Madison	Lake	7.0 A	B	Boating	Stressed	Nutrients	On-site Systems
HUNT CREEK	0602-0051	Madison	River	0.5 Mi.	C(T)	Aesthetics	Threatened	Nutrients	Agriculture
LAKE MORAINE	0602-0007	Madison	Lake	235.0 A	B	Boating	Impaired	Nutrients	On-site Systems
NORWICH RESERVOIR	0602-0010	Chenango	Lake(R)	15.0 A	A	Water Supply	Stressed	Nutrients	On-site Systems
OSBORNE CREEK	0602-0030	Broome	River	3.0 Mi.	C	Fish Propagation	Stressed	Silt (Sediment)	Streambank Erosion
OTSELIC RIVER	0602-0015	Chenango	River	15.0 Mi.	C(T)	Fish Propagation	Stressed	Thermal Changes	Agriculture
OTSELIC RIVER	0602-0024	Cortland	River	14.5 Mi.	C(T)	Fish Survival	Stressed	Silt (Sediment)	Streambank Erosion
OTSELIC RIVER	0602-0028	Broome	River	1.0 Mi.	C	Fish Survival	Stressed	Silt (Sediment)	Roadbank Erosion
OTSELIC RIVER	0602-0043	Madison	River	6.0 Mi.	CT, C	Fish Propagation	Stressed	Thermal Changes	Agriculture
PAGE BROOK	0602-0029	Broome	River	5.0 Mi.	C	Fish Propagation	Impaired	Nutrients	Agriculture
PAGE BROOK	0602-0036	Broome	River	5.0 Mi.	C	Aesthetics	Stressed	Silt (Sediment)	Construction
PAYNE BROOK	0602-0003	Madison	River	2.2 Mi.	B(T)	Fishing	Precluded	Oxygen Demand	Municipal
PHELPS CREEK	0602-0035	Broome	River	3.0 Mi.	C	Aesthetics	Stressed	Silt (Sediment)	Construction
PLYMOUTH RESERVR.	0602-0014	Chenango	Lake	78.0 A	B	Boating	Stressed	Nutrients	On-site Systems
SONG LAKE	0602-0019	Cortland	Lake	109.0 A	B	Bathing	Impaired	Nutrients	Agriculture
TIOUGHNIOGA RIVER	0602-0002	Cortland	River	13.5 Mi.	B(T)	Fishing	Impaired	Other Pollutant	Source Unknown
TULLY LAKE	0602-0018	Cortland	Lake	115.0 A	B	Bathing	Impaired	Nutrients	Municipal

(continued on next page...)

Reference 33

FINAL

Remedial Investigation Report
Rosen Site
Cortland, New York

Volume 1 of 3

Contributing Potentially Responsible Parties

October 1992
(Revised May 1994)

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

6723 Towpath Road
Syracuse, New York 13214
(315) 446-9120

APPENDIX B

Regional Well Evaluation

The purposes of this appendix are to provide:

- A summary of regional wells in the Cortland area, including locations and specifications;
- A summary of regional water quality data for volatile organic compounds (VOCs); and
- An interpretation of the regional water quality in relation to the water quality observed at the Rosen Site.

While the first two purposes of this appendix are straightforward, the latter purpose required careful evaluation of information beyond just the water quality data including well construction and location data, historical and current industries and entities in the Cortland area, regional hydrogeologic characteristics, and/or general hydrogeologic principles.

Investigations, reports, and/or data referenced in this appendix are fully documented in Section 5 of this Remedial Investigation Report.

Regional Well Locations and Specifications

There are approximately 150 ground-water wells (excluding those installed during the Remedial Investigation [RI] at the Rosen Site) in the Cortland area. These wells serve a variety of functions. Most wells are ground water observation points, and a few serve as industrial and domestic water supplies. The ground-water observation or monitoring wells are, for the most part, associated with the Otter Creek - Dry Creek Remedial Investigation of potential ground-water impacts reportedly associated with the Smith Corona plant, located in South Cortland. Other monitoring wells present in the Cortland area were installed as a part of underground storage tank investigations, property audits, United States Geological Survey (USGS) hydrogeologic studies, and/or other investigations.

Of these 150 wells, approximately a third, or about 45 wells, are located in areas potentially hydraulically downgradient of the Rosen Site. In addition, approximately 8 wells are located in the proximity of the Rosen Site in areas believed to be hydraulically upgradient of the site. The well construction specifications, if known and available, of these 53 wells are summarized in Table B-1. The approximate locations of these 53 wells are depicted on Figure B-1.

The majority of these 53 wells were installed under the oversight of the USGS or the Cortland County Planning Department (CCPD). Those wells not installed under the USGS or CCPD are discussed below:

- S&B Roofing Wells #1 through #3 were installed in March 1989 by Empire Soils Investigations, Inc. (Empire) as a part of an environmental site assessment for Wallace Industries, Inc (Empire, May 1989). These wells monitor the upper outwash unit.
- Cortland County Recycling Center Wells MW-1 and MW-2 were installed on September 8, 1989 by North Star Drilling Co. for Barton & Loguidice, P.C. (North Star, September 1989). These wells are installed in the upper outwash unit.

- Christian Assembly of God Church Wells 1 and 2 as well as Test Pit 2 were installed in 1990 by Buck Engineering as a part of a site audit for the Church. These wells were installed in test pits, and no construction specifications were provided (Buck Engineering, March 1990 and June 1990). These wells are believed to monitor the upper outwash unit.

- Public Works Garage Wells MW-1 through MW-3 were installed by Buck Engineering as a part of a "Subsurface Contaminant Investigation" for the City of Cortland Department of Public Works. These wells were installed in test pits, and no construction specifications were provided (Buck Engineering, October 1990). These wells are believed to be installed in the upper outwash unit.

- Public Works Garage Well MW-7 and Fire Station Wells MW-8 and MW-9 were installed under the oversight of Resource Associates for the City of Cortland as a part of a underground storage tank (UST) investigation associated with New York State Department of Environmental Conservation (NYSDEC) Spills No. 91-08345 and 91-08299 (Resource Associates, February 1992). These wells are installed in the upper outwash unit.

- Hess Wells MW-1 through MW-9 were monitored and/or installed under the direction of Stearns & Wheler for the Amerada Hess Corporation as a part of a ground-water investigation at former Hess Station 32252 (Stearns & Wheler, September 1991 and January 1992). These wells are installed in the upper outwash unit.

- Dowser Wells #2A and #3 were installed in January 1992 by North Star Drilling under the direction of Buck Engineering for Dowser Electric as a part an environmental investigation (Buck Engineering, April 1992). The installation dates of and well specifications for Dowser Wells #1 and #2 are not known.

- Wells #173 and #176 are believed to be former industrial water supply wells at the former location of the Brewer Titchener Corporation and the present location of the Rubbermaid Corporation. Both these wells are located within the lower outwash unit.

- Wells #181 and the ETL wells are believed to be current industrial water supply wells at the present locations of the Brewer Titchener Corporation and ETL Testing Laboratories, Inc. Both these wells are located within the upper outwash unit.

<u>Regional Water Quality</u>

There have been several regional ground-water sampling and analysis events conducted in the Cortland area. The analytical results obtained from these events <u>as reported</u> are discussed below. It should be noted that these results were not reported with detailed quality assurance/quality control (QA/QC) data. Therefore, these analytical data have not been validated as a part of this evaluation nor were these analytical data believed to be validated as a part of the regional sampling and analytical events discussed.

The majority of the 53 wells described in the section above have been sampled as part of the Otter Creek - Dry Creek Remedial Investigation. The CCPD and the USGS have conducted two sampling and analytical events, one in April 1990 and one in September 1990 for this investigation. In April 1990, ground-water samples were collected from wells within the Cortland area by representatives of the USGS. These samples were analyzed by Dr. Peter M. Jeffers of SUNY College at Cortland, Department of Chemistry. Ground-water samples were collected and analyzed by Dr. Peter M. Jeffers from Cortland area wells again in September 1990.

Samples were analyzed for dichloroethene; 1,1,1-trichloroethane; trichloroethene;tetrachloroethene;

1,1-, cis-, and trans- isomers of dichloroethene; benzene; toluene; xylene; 1,4-dichlorobenzene; bromodichloromethane; methylene chloride; trichloromethane; and carbon tetrachloride.

Dr. Jeffers used four different column/detector combinations in the analysis of these ground-water samples:

- A 20-inch UCW-98 column with a Hall electrolytic conductivity detector;
- A 6-foot Poracil-C/n-octane column with a Hall electrolytic conductivity detector for the laboratory and field spike comparisons;
- The UCW-98 followed by the Porcil column, with a Hall electrolytic conductivity detector.
- A final set of analyses utilized the combined column pair with a hydrogen flame ionization detector.

The results of the April 1990 and the September 1990 CCPD/USGS sampling events (Jeffers, May 1990 and Jeffers, September 1990) are provided in Table B-1 for the 45 wells potentially hydraulically downgradient of the Rosen Site and the 8 wells believed to be hydraulically upgradient and near the Rosen Site. Table B-2 sets forth the results of all wells monitored as part of the Otter Creek - Dry Creek Remedial Investigation.

Of the chlorinated and aromatic hydrocarbons analyzed, predominantly trichloroethene and 1,1,1 trichloroethane were detected. The highest concentrations of trichloroethene were detected at the monitoring wells near the Smith Corona plant. Of the wells believed to be hydraulically downgradient of the Rosen Site, relatively higher concentrations of trichloroethene (15.2 ug/L) and 1,1,1-trichloroethane (107.5 ug/L) were detected at USGS 90-1S, which is located at the city of Cortland Public Works Garage. Dichloroethanes and dichloroethenes were also detected at this well at concentrations of 25 ug/L and 28.9 ug/L, respectively. Concentrations ranging from 15 ug/L to 1 ug/L of trichloroethene, 1,1,1-trichloroethane, and other chlorinated hydrocarbons were detected at USGS 90-2 (#335), 2821 Kellog (#346). Concentrations generally near or less than 1 ug/L of trichloroethene, 1,1,1-trichloroethane, and/or other chlorinated hydrocarbons were detected at 53 Greenbush (#366), Old Hess (MW-3), the Cortland County Office Building well (#177), and Elm B (#282). Trichloroethene, 1,1,1-trichloroethane, and other chlorinated hydrocarbons were also detected at the hydraulically upgradient wells Dowser #1, #2, #2A, and #3 at concentrations ranging from less than 1 ug/L to 18.7 ug/L.

Other sampling and analysis events not conducted by the CCPD and/or the USGS in the Cortland area are also summarized in Table B-1 and described below:

- S&B Roofing Wells #1 through #3 were sampled on March 21, 1989 by Empire and analyzed by Huntington Analytical Services for purgeable halocarbons by EPA Method 601, purgeable aromatics by EPA Method 602, organochlorine pesticides and PCBs by EPA Method 608, and semivolatile priority pollutants by EPA Method 625 (Empire, May 1989). 1,1,1-trichloroethane and 1,1-dichloroethane were the predominant constituents detected. Concentrations ranged from 360 ug/L to 430 ug/L of 1,1,1-trichloroethane and 75 ug/L to 100 ug/L of 1,1-dichloroethane. In addition, several dichloroethenes, trichloroethene, tetrachloroethenes, and 1,2-dichloroethane were detected.
- Recycling Center wells #1 and #2 were sampled by Buck Engineering on September 8, 1989 and analyzed by Buck Environmental Laboratories, Inc. for purgeable halocarbons by EPA Method 601 (Buck Environmental Laboratories, Inc. 1989). Both 1,1,1-trichloroethane (23.2 ug/L and 43.2 ug/L) and 1,1-dichloroethane (ND to 2.5 ug/L) were detected.

- Christian Assembly of God Church Wells 1 and 2 were sampled on June 6, 1990 and ground water from Test Pits 1 and 2 was sampled on March 18, 1990 by Buck Engineering (Buck Engineering, March 1990 and June 1990). These samples were analyzed for benzene, toluene, and xylenes (BTX) by EPA Method 602 and purgeable halocarbons by EPA Method 601. 1,1,1-trichloroethane (29 ug/L and 49.5 ug/L), 1,1-dichloroethane (4.7 ug/L and 10.7 ug/L), trichloroethene (7.0 ug/L and 7.4 ug/L), and tetrachloroethene (1.2 ug/L and 1.0 ug/L) were detected at Test Pit 1 and Well 1. No constituents were detected at Test Pit 2 and Well 2.

- Public Works Garage Wells MW-1 through MW-3 and USGS 90-1-S (MW-4) were sampled by Buck Engineering on September 18, 1990 and October 3, 1990 and analyzed by Buck Environmental Laboratories, Inc. for volatile aromatic and unsaturated organics by EPA Method 503.1 and purgeable halocarbons by EPA Method 601 (Buck Engineering, October 1990). 1,1,1-trichloroethane (30.2 ug/L to 331.0 ug/L), 1,1-dichloroethane (3.9 ug/L to 51.6 ug/L), and trichloroethene (3.0 ug/L to 15.9 ug/L) were detected at these wells.

- Public Works Garage Wells MW-1, MW-3, MW-4 (USGS-90-1S), and MW-7, and Fire Station Wells MW-8 and MW-9 were sampled by Buck Engineering on December 11, 1991 and analyzed by Buck Environmental Laboratories, Inc. for volatile aromatic and unsaturated organics by EPA Method 503.1 (Resource Associates, February 1992). Trichloroethene was detected in concentrations ranging from 3.3 ug/L to 14.1 ug/L.

- Hess Wells MW-1 through MW-9 were sampled by Stearns & Wheler and analyzed by Toxikon for purgeable aromatics by EPA Method 602 (Stearns & Wheler, September 1991 and January 1992). Benzene, toluene, ethylbenzene, and xylenes (BTEX) were detected.

- Dowser Wells #1, #2A, and #3 were sampled by Buck Engineering on February 24, 1992 and analyzed by Buck Environmental Laboratories, Inc. for VOCs by EPA Method 502.2 (Buck Engineering, April 1992). 1,1,1-trichloroethane was detected at two of these wells at concentrations of 6.6 ug/L and 18.7 ug/L.

<u>Interpretation of Regional Water Quality in Relation to the Rosen Site</u>

Prior to interpreting the regional water quality data in relation to the Rosen Site, this section first summarizes the relevant hydrogeologic and water quality data obtained during the Remedial Investigation (RI) at the Rosen Site:

- 1,1,1-trichloroethane and its degradation product, 1,1-dichloroethane are the predominant constituents detected at the Rosen Site. These VOCs were detected within the upper outwash ground-water flow system associated with the site. Concentrations of 1,1,1-trichloroethane ranged from 3,400 ug/L to 1,100 ug/L at the interior of the site and 4 ug/L to 270 ug/L at the downgradient perimeter of the site. Concentrations of 1,1-dichloroethane ranged from 430 ug/L to 340 ug/L at the interior and 2 ug/L to 100 ug/L at the downgradient perimeter of the site.

- The distribution of these constituents indicates that 1,1,1-trichloroethane and 1,1-dichloroethane have not migrated into the confining unit nor the lower outwash unit. Further, the highest concentrations of these constituents are detected in the lower portion of the upper outwash unit, above the confining unit, at both the northern perimeter of the site and off-site along Huntington Street. The saturated thickness of the upper outwash unit ranges from approximately 35 to 55 feet at these locations.

- Ground-water flow in the upper outwash is toward the northeast both at the site and off-site along Huntington Street.

Therefore, in consideration of the above RI results, regional wells, if any, that would be affected by the Rosen Site would be expected to have concentrations of 1,1,1-trichloroethane and 1,1-dichloroethane less than the concentrations detected at the site (due to dispersion and dilution), to have low to no concentrations of these constituents in the upper portion of the upper outwash unit (due to dilution from recharging precipitation), and to be located to the northeast of the site, the hydraulically downgradient direction.

As observed during the RI, the highest concentrations of 1,1,1-trichloroethane and 1,1-dichloroethane were detected near potential source areas of these constituents at the site. At the perimeter of the site and off-site along Huntington Street, the concentrations of 1,1,1-trichloroethane and 1,1-dichloroethane decrease by a half order of magnitude, and the highest concentrations are observed within the lowermost 10 to 20 feet of the upper outwash unit as opposed to within the uppermost 10 feet of the upper outwash unit.

Further from the site, directly recharging waters from precipitation would be expected to further direct the ground water containing 1,1,1-trichloroethane and 1,1-dichloroethane vertically downward in the upper outwash, additional lateral dispersion would occur as a result of ground-water migration, and additional mixing with other ground waters originating from other recharge areas within the upper outwash would occur causing further dilution of these constituents in the ground water. This expectation of a decrease in concentrations further from the potential source areas is based on observations at the site and general hydrogeologic principles. However, any interpretations will be tempered by the recognition that the distribution of 1,1,1-trichloroethane and 1,1-dichloroethane associated with the site has only been investigated in detail recently during the RI and may have been different in the past. In addition, there would be a time lag between the distribution of constituents at the site and their potential distribution off-site as a result of migration within the ground-water flow system.

Although the direction of ground-water flow observed at the Rosen Site is toward the northeast, further north of the site and along Huntington Street, the direction of ground-water flow likely becomes more easterly. Current updated regional ground-water flow studies and models are in progress by the USGS. Past USGS models have depicted ground-water flow at the Rosen Site as more easterly than northerly. Ground-water elevations obtained during the RI at the Rosen Site clearly show ground-water flow to the northeast. The updated USGS model will utilize the ground-water elevations obtained during the Rosen Site RI.

In light of the above, an interpretation of the regional water quality data collected by the CCPD, USGS, and others from the 53 regional wells in the proximity of the Rosen Site is presented below.

- The S&B Roofing Wells #1 through #3 are the closest regional wells to the site and are located to the northeast just across Pendleton Street. These wells are believed to be hydraulically downgradient of Rosen Site. These wells are installed in the uppermost 5 feet of the saturated upper outwash (Note: The screens span a depth of 5 to 20 feet below ground level, and the top of the water column was observed to be about 14 to 15 feet below ground level). Both 1,1,1 trichloroethane (360 to 410 ug/L) and 1,1-dichloroethane (75 to 100 ug/L) were detected at essentially the same concentration at each location. These constituents could have plausibly originated at the Rosen Site.

  It should be noted that observations made during the Environmental Site Assessment for the S&B Roofing property, suggest that there may be sources of VOCs, including 1,1,1-trichloroethane and 1,1-dichloroethane, and/or other constituents at the S&B Roofing property as follows:

  - Four to 5 feet of fill (described as predominantly construction debris) is present throughout much of the S&B property.

  - A "kerosene" odor was noted during the installation of test pit TP-3 in the middle of the property.

- 1,1,1-trichloroethane was detected in a soil sample from test pit TP-3 (95 ug/kg).

- Photoionization detector (PID) measurements were observed above 1 ppm in the unsaturated soils at the boring for MW-3 (Empire, May 1989).

- Cortland County Recycling Center wells #1 and #2 do not appear to be hydraulically downgradient of the Rosen Site, i.e., they are more east of the site than the northeast. However, these wells may be hydraulically downgradient as the northeast ground-water flow component observed at the Rosen Site becomes more easterly further north of the site. These wells are about 1,000 feet from the site and are screened in the upper 10 feet of the upper outwash. 1,1,1 trichloroethane (23.2 ug/L and 43.2 ug/L) and 1,1-dichloroethane (2.5 ug/L) were detected at these wells. These constituents could have plausibly originated at the Rosen Site.

  It should be noted that there were observations made during the installation of these wells (North Star, September 1989), which suggest that there may be sources of VOCs and/or other constituents at the Cortland County Recycling Center as follows:

  - About 3 feet of fill (described as coal, ash, and cinders) is present at the property.

  - The recycling center is adjacent to a former sheet metal company, a former metal recovery operation, and a current auto finisher. These types of operations commonly used 1,1,1-trichloroethane as a degreasing/cleaning solvent.

- The Christian Assembly of God Wells 1 and 2 are approximately 1,800 feet northeast and hydraulically downgradient of the Rosen Site. These wells are installed in test pits, assumed to be within the upper few feet of the upper outwash. At this distance from the site, the concentrations of 1,1,1-trichloroethane and 1,1-dichloroethane in the uppermost section of the water column would be expected to be non-detect or lower than those detected (1,1,1-trichloroethane: 29 ug/L and 49.5 ug/L; 1,1-dichloroethane: 4.7 ug/L and 10.7 ug/L) in the ground water from Test Pit 1 and Well 1.

  It should be noted that observations made during the site audit suggest that there may be sources of VOCs and/or other constituents in this area as follows:

  - Up to 7 feet of fill (described as black soil, asphalt, concrete, metal fragments, bricks, ash, and small debris) is present at the property.

  - A portion of the property was used as a salvage yard, and a portion formerly housed a factory building that burned down.

  - The site audit hypothesizes that the source of the VOCs detected could be within the fill at the property or could originate from other past and present industries/entities including the Rosen Site and the City of Cortland Public Works Garage.

- The Public Work Garage Wells MW-1, MW-2 and MW-3 are approximately 2,000 feet northeast of the Rosen Site and are believed to be hydraulically downgradient. These wells are installed in test pits, assumed to be within the upper few feet of the upper outwash. At this distance from the site, the concentrations of 1,1,1-trichloroethane and 1,1-dichloroethane in the uppermost section of the water column at these wells would be expected to be non-detect or at lower concentrations than those detected at wells MW-1 and MW-3. USGS-90-1S (MW-4) was sampled at the same time as wells MW-1 through MW-3. This well is installed deeper in the upper outwash and screened from 30 to 34 feet below ground level. The bottom of the upper outwash in this area is about 64 feet below ground level, where the silt-clay confining unit is present. The 1,1,1-trichloroethane (86.5 ug/L to 174 ug/L) and 1,1-dichloroethane (25.0 ug/L to 32.1 ug/L) at the concentrations detected at USGS-90-1S could have plausibly originated from the Rosen Site. However, the higher concentrations of these constituents detected at MW-3 (331 ug/L for 1,1,1-trichloroethane and 51.6 ug/L for 1,1-dichloroethane) and comparable concentrations at MW-1 (73.8 ug/L for 1,1,1-trichloroethane and 12.4 ug/L for 1,1-dichloroethane), both monitoring the upper few feet of the upper outwash or about 15 to 20 feet higher than USGS-90-1S, suggest that there may be sources of these constituents at or in the area of the Public Works Garage.

The "Subsurface Contaminant Investigation" Report (Buck Engineering, October 1990) for the Public Works Garage hypothesizes that the contamination may originate, in part, from the former channel of Perplexity Creek. Reportedly, Perplexity Creek was rerouted in 1939, well before Rosen operations. Therefore, this hypothesized surface water pathway is unlikely since Perplexity Creek currently flows directly east of the Rosen Site and not to the northeast.

- USGS 90-1D and 91-1 are also installed at the Public Works Garage. These wells monitor the silt-clay confining unit and the bedrock, respectively. Reportedly, no VOCs were detected at USGS 91-1, and USGS 90-1D has not been sampled. These wells would not be expected to be affected by the Rosen Site, as they monitor the confining unit that has not been affected at the site and the bedrock unit below the confining unit.

- Public Works Wells MW-7, MW-8, and MW-9 are hydraulically downgradient of the Rosen Site. However, each of these wells is installed within the uppermost 10 to 15 feet of the upper outwash, which may be too shallow to monitor ground waters potentially affected by the Rosen Site. The ground water from these wells has not been analyzed by a method which quantifies 1,1,1-trichloroethane and 1,1-dichloroethane.

- The well at 53 Greenbush does not appear to be hydraulically downgradient of the Rosen Site. Although low concentrations (<1 ug/L) of VOCs have been detected at this well, the concentrations of these VOCs may be due to regional background water quality.

- Wells #173 and #176 are believed to be installed within the lower outwash. These wells would not be expected to be affected by the Rosen Site, as they monitor the lower outwash unit beneath the confining unit. Both the confining unit and the lower outwash have not been affected at the Rosen site. Wells #173 and #176 have not been sampled.

- The Hess wells are northeast of the Rosen Site; however, they are likely not hydraulically downgradient of the site. Only low concentrations (< 1 ug/L) of VOCs have been detected at Hess well MW-3. Although ground water from the other Hess wells has not been analyzed for chlorinated VOCs, the concentrations would be expected to be similar to those detected at MW-3. The concentrations of these VOCs may be due to regional background water quality.

- USGS 91-4S and #177 located at the Cortland County Office Building do not appear to be hydraulically downgradient of the Rosen Site. Although low concentrations (<1 ug/L) of VOCs have been detected at these wells, the concentrations of these VOCs may be due to regional background water quality.

- USGS 90-2, Elm A and B, #181, and Yaman A and B do not appear to be hydraulically downgradient of the Rosen Site. Although low concentrations (<1 ug/L) of VOCs have been detected at two of these wells, the concentrations of these VOCs may be due to regional background water quality.

- The 2821 Kellog well (#346) does not appear to hydraulically downgradient of the Rosen Site. However, this well may be hydraulically downgradient as the northeast ground-water flow component observed at the site becomes more easterly and southeasterly near the Tioughnioga River. This well is installed in the upper outwash and screened from 20 to 24 feet below ground level. The bottom of the upper outwash in this area is about 43 feet below ground level, where the silt-clay confining unit is encountered. The 1,1,1-trichloroethane and 1,1-dichloroethane at the concentrations detected at 2821 Kellog (11.5 ug/L to 13.8 ug/L for 1,1,1-trichloroethane and 5.2 ug/L for 1,1-dichloroethane) could be due to regional background water quality based on the concentrations of these VOCs detected at wells hydraulically upgradient of the Rosen Site.

- The ETL wells do not appear to be hydraulically downgradient of the Rosen Site. These wells are east of the Tioughnioga River and would be likely not be impacted since most ground waters discharge to the Tioughnioga River in this area.

- Wells Dowser #1 through #3 and CT-3S, CT-3D, and CT-11 are located hydraulically upgradient of the Rosen Site. These wells are believed to be installed within the upper outwash. VOCs including 1,1,1-trichloroethane and 1,1-dichloroethane have been detected at these wells at concentrations ranging from 0.5 ug/L to 18.7 ug/L and 0.4 ug/L to 0.5 ug/L, respectively. These concentrations suggest that there are upgradient sources of these VOCs, and the concentrations of these VOCs may be due to background regional water quality.

TABLE B-1
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Downgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results: Date	Analytical Results: Constituents Detected	Analytical Results: Concentration (ug/L)	Analytical Method
S&B Roofing #1	100 NE	0-2 ft. Fill 2-20 ft. Silt, fine to coarse sand grades to sand and gravel	Upper Outwash	5-20	May be suitable upon inspection.	3/89	1,1,1-trichloroethane	360	EPA 601, 602
							1,1-dichloroethene	7.5	
							1,1-dichloroethane	75	
S&B Roofing #2	500 NE	0-0.5 ft. Topsoil 2-20 ft. Silt, fine to coarse sand grades to sand and gravel.	Upper Outwash	5-20	May be suitable upon inspection.	3/89	trichloroethene	2.7	EPA 601, 602, 608
							1,1,1-trichloroethane	430	
							1,1-dichloroethane	85	
							1,1-dichloroethene	11	
S&B Roofing #3	650 NE	0-2 ft. Sand and silt 2-20 ft. Sand and gravel	Upper Outwash	5-20	May be suitable upon inspection.	3/89	trichhloroethene	19	EPA 601, 602, 608
							1,1,1-trichloroethane	410	
							tetrachloroethene	1.1	
							1,1-dichloroethane	100	
							1,1-dichloroethene	13	
							1,2-dichloroethane	1	
							trans 1,2-dichlorethene	2	
							1,1,2,2-tetrachloroethene	1.1	
Recycling Center Well #1	1,000 E-NE	0-22 ft. Sand & Gravel	Upper Outwash	12-22	May be suitable upon inspection.	9/08/89	1,1,1-trichloroethane	23.2	EPA 601
Recycling Center Well #2	1,000 E-NE	0-26 ft. Sand & Gravel	Upper Outwash	18-26	May be suitable upon inspection.	9/08/89	1,1-dichloroethane	2.5	EPA 601
							1,1,1-trichloroethane	43.2	

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Downgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results			Analytical Method
						Date	Constituents Detected	Concentration (ug/L)	
Christian Assembly of God Church Well 1	1,800 NE	0-3 ft. Soil and Cobbles 3-7 ft. Fill (ashes, wood) 7-8 ft. Till (?)	Upper Outwash(?)	No information	Not suitable due to installation methods. Shallow well installed in test pit.	3/18/90	1,1,1-trichloroethane	29 0	EPA 601/602
							trichloroethene	7.0	
							1,1-dichloroethane	4 7	
							tetrachloroethene	1.2	
						6/6/90	1,1-dichloroethane	10.7	EPA 601/602
							1,1,1-trichloroethane	49 5	
							trichloroethene	7.4	
							tetrachloroethene	1 0	
Christian Assembly of God Church Well 2	1,800 NE	No well log	No information	No information	Not suitable due to installation methods. Shallow well installation in test pit.	6/6/90	ND		EPA 601/602
Christian Assembly of God Church Test Pit 2	1,800 NE	0-3 ft. Soil and cobbles 3-9 ft. Fill (ash, asphalt, concrete and soil) 9-10 ft. Till (?)	---	---	Test pit	3/18/90	ND		EPA 601/602
Public Works Garage MW-1	2,000 NE	Probably Sand & Gravel based on USGS 90-1S	No information	No information	Not suitable due to installation methods. Shallow well installed using an excavator.	9/18/90	1,1-dichloroethane	12.4	EPA 601
							1,1,1-trichloroethane	73.8	
							trichloroethene	9.0	
						9/18/90	trichloroethene	8.5	EPA 503 1
						12/11/91	trichloroethene	13 6	EPA 503 1
Public Works Garage MW-2	2,000 NE	Probably Sand & Gravel based on USGS 90-1S	No information	No information	Not suitable due to installation methods. Shallow well installed using an excavator.	10/3/90	1,1-dichloroethane	3 9	EPA 601
							1,1,1-trichloroethane	30 2	
							trichloroethene	3.0	

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Downgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results: Date	Analytical Results: Constituents Detected	Analytical Results: Concentration (ug/L)	Analytical Method
Public Works Garage MW-3	2,000 NE	Probably Sand & Gravel based on USGS 90-1S	No information	No information	Not suitable due to installation methods. Shallow well. Installed using an excavator.	9/18/90	1,1-dichloroethane	51.6	EPA 601
							1,1,1-trichloroethane	331.0	
							trichloroethene	8.2	
						9/18/90	trichloroethene	8.8	EPA 503.1
						12/11/91	trichloroethene	7.7	EPA 503.1
USGS 90-1D (#334) (Public Works Garage MW-5)	2,000 NE	0-64 ft. Sand & Gravel 64-107 ft. Silt & Clay	Confining Unit	93-98	May be suitable upon inspection.	NS	NS	NS	NS
USGS 90-1S (#332) (Public Works Garage MW-4)	2,000 NE	0-34 ft. Sand & Gravel	Upper Outwash	30-34	May be suitable upon inspection.	9/18/90	1,1-dichloroethane	36.1	EPA 601
							1,1,1-trichloroethane	86.5	
							trichloroethene	13.0	
							methylene chloride	'trace'	
						9/18/90	trichloroethene	14.0	EPA 503.1
						9/90	1,1,1-trichloroethane	107.5	Jeffers
							trans 1,2-dichloroethene	28.9	
							trichloroethene	15.2	
							1,1-dichloroethane	25.0	
							toluene	2.0	EPA 601
						10/1/90	1,1-dichloroethane	37.1	
							1,1,1-trichloroethane	174	
							trichloroethene	15.9	
						12/10/91	trichloroethene	13.8	EPA 503.1

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Downgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results			Analytical Method
						Date	Constituents Detected	Concentration (ug/L)	
USGS 91-1 (Public Works Garage MW-6)	2,000 NE	0-64 ft. Sand & Gravel 64-138 ft. Silt/Clay 138-149 ft. Gravel 149-180 ft. Fine to medium Sand, some silt 180-184 ft. Fine gravel and coarse Sand 184-227 ft. Gravel 227-234 ft. Silt/Sand 234-280 ft. Pebbly fine to medium Sand, some silt 280-313 ft. Cobble gravel 313 ft. Olive grey Siltstone/Sandstone	Bedrock	Open Ended at 310		1/16/91	According to USEPA - ND		Jeffers
Public Works Garage (MW-7)	2,000 NE	0-25 ft. Gravel	Upper Outwash	10-25	Well may be suitable upon inspection.	12/11/91	trichloroethene	14.1	EPA 503.1
Firestation (MW-8)	2,500 NE	0-14 ft. Sand & Gravel	Upper Outwash	4-14	Well may be suitable upon inspection.	12/11/91	trichloroethene	3.3	EPA 503.1
Firestation (MW-9)	2,500 NE	0-20 ft. Sand and Gravel	Upper Outwash	5-20	Well may be suitable upon inspection.	12/11/91	trichloroethene	4.4	EPA 503.1
53 Greenbush (#366)	2,000 N	No information	No information	No information	May be suitable upon inspection; however, no information on construction.	4/90 Sample 1 Sample 2 Sample 1 Sample 2 Sample 1 Sample 2 Sample 2 9/90	 1,1,1-trichloroethane trichloroethene tetrachloroethene cis 1,2-dichloroethene 1,1,1-trichloroethane trichloroethene tetrachloroethene	 0.2 0.2 0.7 0.5 0.75 0.4 0.1 0.4 0.8 0.5	Jeffers
#173	2,250 NE	Depth 155 ft.; ends in Sand.	No information	No information	Probable former production well at Brewer Titchener.	NS	NS	NS	NS

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Downgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results			Analytical Method
						Date	Constituents Detected	Concentration (ug/L)	
C-17	2,500 NE	0-35 ft. Gravel 35-96 ft. Silt 96-103 ft. Hard plan or rock.	No information	No information		NS	NS	NS	NS
Old Hess (MW-3) (#365)	2,500 NE	No information	No information	No information	May be suitable upon inspection; however, no information on construction.	4/90	1,1-dichloroethene	0.3	Jeffers
						4/90 9/90	1,1,1-trichloroethane	0.5 0.3	
						4/90 9/90	toluene	4.5 42.5	
						4/90 9/90	xylene	2.0 5.3	
						4/90 9/90	benzene	"trace" 2.1	
						9/90	trans 1,2-dichloroethene	0.4	
						9/90	cis 1,2-dichloroethene	0.06	
						9/90	trichloroethene	0.1	

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Downgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results			Analytical Method
						Date	Constituents Detected	Concentration (ug/L)	
Hess Wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6	2,500 NE	0-15 ft. Sand, some Gravel	Upper Outwash	All approximately 5 to 14.5		8/17/89 (MW-1 through MW-4 only)	benzene	27.1 to 689	EPA 602
							toluene	20.5 to 4,610	
							ethylbenzene	50 7 to 1,740	
							xylenes	664.3 to 11,720	
						7/26/91	benzene	ND-250	EPA 602
							toluene	ND-2,700	
							ethylbenzene	ND-250	
							xylenes	ND-7,900	
						11/91	benzene	ND-1,180	
							toluene	ND-6,360	
							ethylbenzene	ND-2,700	
							xylenes	ND 11,700	
Hess Wells MW-7, MW-8 and MW-9	2,500 NE	0-17 ft. Sand & Gravel	Upper Outwash	6 to 16 or 7 to 17		11/91	benzene	4 to 45	EPA 602
							toluene	4 to 23	
							ethylbenzene	3 to 38	
							xylenes	45 to 87	
Rubbermaid (#176)	3,200 N	0-35 ft. Sand & Gravel 35-130 ft. Clay 130-185 ft. Gravel	No information	No information	Probable Former Production Well	NS	NS	NS	NS
Cortland County Office Building USGS 91-4(S)	3,500 N	0-9 ft. Fill 9-33 ft. Sand & Gravel	Upper Outwash	23-33	May be suitable upon inspection.		NS		

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN
THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Downgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results			Analytical Method
						Date	Constituents Detected	Concentration (ug/L)	
Cortland County Office Building (#177)	3,500 N	0-5 ft. Fill 5-16 ft. Clay & Gravel 16-55 ft. Sand & Gravel 55-85 ft. Clay 85-102 ft. Sand & Gravel	No Information	No Information	May be suitable upon inspection.	4/90	"trace" toluene trans 1,2-dichloroethene tetrachloroethene trichloromethane carbon tetrachloride	 0.3 0.25 0.7 <0.2	Jeffers
USGS 90-2 (#335)	3,750 NE	0-46 ft. Sand & Gravel 46-50 ft. Fine Sand and Silt 50-56 ft. Silt and Clay 56-66.5 ft. Till, Bedrock @ 65.5 feet	Upper Outwash	30-34	May be suitable upon inspection.	9/90	1,1,1-trichloroethane trichloroethene	2.7 0.1	Jeffers
2821 Kellogg (#346)	4,250 E	0-37.5 ft. Sand & Gravel 37.5-43 ft. Clay, Silt, and Fine Sand 43-99 ft. Clay, Silty Clay	Upper Outwash	20-24	May be suitable upon inspection.	4/90 Sample 1 Sample 2 Sample 1 Sample 2 Sample 3 9/90 	 1,1-dichloroethene 1,1,1-trichloroethane "Trace" toluene benzene 1,1,1-trichloroethane trans 1,2-dichloroethene 1,1-dichloroethane	 1.1 3.0 11.5 15.0 1.4 13.8 0.6 5.2	Jeffers
Elm A (#279)	5,400 NE	0-5 ft. Fill 5-37 ft. Sand & Gravel 37-44 ft. Clay with stones; (Till?) 44-45 ft. Shale Bedrock @ 45 ft.	Upper Outwash	24.5-29.5	May be suitable upon inspection. Well was constructed with rubber packer and backfilled around screen with native materials.	NS	NS	NS	NS

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Downgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results			Analytical Method
						Date	Constituents Detected	Concentration (ug/L)	
Elm B (#280)	5,000 NE	0-45 ft. Sand and Gravel 45-50 ft. Fine to coarse Sand, gravel and clay	Upper Outwash	29.5-34.5	May be suitable upon inspection. Well was constructed with rubber packer and backfilled around screen with native materials.	4/90 Sample 1 Sample 2 Sample 1 Sample 2 Sample 2 Sample 3 9/90	1,1-dichloroethene 1,1,1-trichloroethane cis 1,2-dichloroethene benzene 1,1,1-trichloroethane	0.2 0.25 1.6 0.7 0.1 0 4 1.5	Jellers
ETL Well A (#281)	4,800 E	0-55 ft. Sand & Gravel 50-60 ft. Clay	Upper Outwash	30-35 and 40-45	East of River.	NS	NS	NS	NS
ETL Well B (#282)	5,000 E	0-55 ft. Sand & Gravel 55-60 ft. Silt/Clay and medium Sand, Clay at 60 ft.	Upper Outwash	35-40 and 45-50	East of River.	NS	NS	NS	NS
ETL Test Well	5,000 E	0-20 ft. Sand & Gravel 20-25 ft. Fine to Medium Sand 25-45 ft. Sand & Gravel 45-47 ft. Fine to coarse Sand 47-56 ft. Sand & Gravel 56-106 ft. Silt, trace clay, very fine sand	No Information	No Information	East of River.	NS	NS	NS	NS
Sewage Plant 1	4,000 E-NE	No Information	No Information	20 (open)	May be suitable upon inspection.	NS	NS	NS	NS
Sewage Plant 2	4,000 E-NE	No Information	No Information	15 (open)	May be suitable upon inspection.	NS	NS	NS	NS
Brewer Titchener (#181)	6,000 NE	0-47 ft. Sand & Gravel	No Information	No Information	Probable Former Production Well	NS	NS	NS	NS

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Downgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results			Analytical Method
						Date	Constituents Detected	Concentration (ug/L)	
Yaman A	8,000 NE	0-10 ft. Gravel and Clay 10-11 ft. Clay 11-13 ft. Coarse Gravel 13-18 ft. Coarse Sand and fine Gravel 18-25 ft. Sand and Gravel with Clay 25-27 ft. Medium Sand 27-32.5 ft. Till 32.5-33 ft. Bedrock	Upper Outwash	14-18 and 21-25	May be suitable upon inspection.	NS	NS	NS	NS
Yaman B	8,000 NE	Depth - 27.5 ft. Geology - same as Yaman A well	Upper Outwash	17.5-21.5 and 23.5-27.5	May be suitable upon inspection.	4/90	ND		Jeffers

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Upgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results			Analytical Method
						Date	Constituents Detected	Concentration (ug/L)	
Dowzer #1 (#359)	1,000 SW	Depth 23 ft.	No information	No information	May be suitable upon inspection; however, no information on construction (upgradient well).	1/90 4/90 2/24/92	1,1,1-trichloroethane ND ND	6	EPA 601 Jeffers EPA 502.2
Dowzer #2 (#360)	400 W	No information	No information	No information	May be suitable upon inspection; however, no information on construction (upgradient well).	1/90 4/90 Sample 1 Sample 2	1,1,1-trichloroethane 1,1-dichloroethene 1,1,1-trichloroethane 1,1-dichloroethene 1,1,1-trichloroethane 1,4-dichlorobenzene	6.6 0.5 6.2 0.4 4.4 0.5	EPA 601 Jeffers
Dowzer #2A	400 W	0-3 ft. Fill 3-7 ft. Silt and Clay 7-23.5 ft. Sand, some gravel 23.5-27 ft. Gravel, sand, some silt	Upper Outwash	9-24	May be suitable upon inspection (upgradient well).	2/24/92	1,1,1-trichloroethane	18.7	EPA 502.2
Dowzer #3	1,000 W	0-3 ft. Fill 3-27 ft. Sand and gravel	Upper Outwash	9.5-24.5	May be suitable upon inspection (upgradent well).	2/24/92	1,1,1-trichloroethane	10.4	EPA 502.2
High School Bus Garage (#321)	1,000 SE	0-55 ft. Silt with fine to coarse Sand & Gravel 55-75 ft. No Recovery 75-85 ft. Sand & Gravel	Lower Outwash	75.5-80.5	May be suitable upon inspection (upgradient well).	9/90	Xylenes Petroleum odor/residue observed 15-17 ft during drilling	0.5	Jeffers
CT-3S	2,000 SW	See CT-3D for Geology		23-28	May be suitable upon inspection.	4/90	ND		Jeffers
CT-3D	2,000 SW	0-5 ft. Fill 5-30 ft. Coarse Gravel 30-35 ft. Silty Gravel 35-40 ft. Pebbly Sand 40-60 ft. Sand & Gravel 60-70 ft. Clay & Fine Sand		50-54	May be suitable upon inspection.	4/90	ND		Jeffers

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TABLE B-1 (Cont.)
REGIONAL WELLS DOWNGRADIENT OF AND UPGRADIENT WELLS IN
THE PROXIMITY OF THE ROSEN SITE

CORTLAND, NEW YORK

Hydraulically Upgradient Wells	Approximate Distance (ft) and Direction from Rosen Site	Geology	Formation Screened	Screen Interval (Feet BGL)	Suitability of Well Use	Analytical Results			Analytical Method
						Date	Constituents Detected	Concentration (ug/L)	
CT-11	5,000 W	0-15 ft. Clay and Sand 15-50 ft. Pebbly Sand 50-60 ft. Sand and Gravel 60-65 ft. Clayey Sand 65-75 ft. Silty Gravel 75-85 ft. Gravel and Sand 85-100 ft. Pebbly Sand and Clay 100-104 ft. Gray Clay	Upper Outwash	38-60	May be suitable upon inspection.	4/90	1,1-dichloroethene	0.5	Jeffers
						4/90	bromodichloromethane	0.1	
						4/90 9/90	1,1,1-trichloroethane	0.5 1.4	
						9/90	trichloroethene	0.04	

Notes:
EPA - Environmental Protection Agency
BGL - Below ground level
ppb - Parts per billion
NS - Not sampled
ND - No constituents detected

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TABLE B-2

CORTLAND COUNTY MONITORING WELL NETWORK
SAMPLING RESULTS (4/90 & 9/90)

CORTLAND, NEW YORK

Well Designation	Date Sampled	1,1-dichloroethene	1,1,1-trichloroethane	1,4-dichlorobenzene	trans 1,2-dichloroethene	cis 1,2-dichloroethene	trichloroethene	tetrachloroethene	bromodichloromethane	methylene Chloride	toluene	xylene	benzene	trichloromethane	carbon tetrachloride	1,1-dichloroethane
CT-4S	4/90		0.2			0.4	2.7									
	4/90		0.3			0.4	2.4									
	9/90		1.0		0.2	0.5	2.6									
CT-4D	4/90		0.4			1.1	2.3									
	4/90		0.4			1.0	1.8									
	9/90		0.3			0.8	1.9									
CT-5S	4/90					1.8	7.0									
	9/90					10.0	24.2									
CT-5D	4/90					23.8	82.8									
	4/90					27.0	57.0									
	4/90					24.7	77.0									
	9/90					16.8	53.9									
CT-11	4/90	0 5	0.5						0 1							
	9/90		1.4				0.04									
CT-21	4/90					29.2	113.6									
	4/90					34.5	101.4									
	4/90					41.1	121.0									
	9/90		0.2			21.0	66.8									
CT-22	4/90					5.4	12.7									
	9/90		0.5			3.5	14.6									
CP-14	4/90					0.05	0.26									
	4/90					1.5	0.2									
	4/90					<0.1	0.2									
USGS 89-1	4/90	2.4														
	4/90	0.1	0.1		1.0											
	4/90										0.8					
	9/90					1.2	0.1									
ELMB	4/90	0.2	1.6													

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TABLE B-2
(CONT'D)

CORTLAND COUNTY MONITORING WELL NETWORK
SAMPLING RESULTS (4/90 & 9/90)

CORTLAND, NEW YORK

Well Designation	Date Sampled	1,1-dichloroethene	1,1,1-trichloroethane	1,4-dichlorobenzene	trans 1,2-dichloroethene	cis 1,2-dichloroethene	trichloroethene	tetrachloroethene	bromodichloromethane	methylene Chloride	toluene	xylene	benzene	trichloromethane	carbon tetrachloride	1,1-dichloroethane
	4/90	0.25	0.7			0.1										
	4/90												0.4			
	9/90		1.5													
Dowzer 2	4/90	0.5	6.2													
	4/90	0.4	4.4	0.5												
Kellog 2821	4/90	1.1	11.5													
	4/90	3 0	15.0													
	4/90										trace		1 4			
	9/90		13 8		0.6											5 2
Ameslot	4/90										0 4					
	9/90		0.02		0.2	0.2	0.06					0 9				
GUNZBARN 10/15	9/90		5.2			6.9	17.4	0.3								
GUNZBARN 10/16	9/90		6.1			6.8	17.0	0.4								
GUNZEN1	9/90		0.04		0.2											
USGS 90-1S	9/90		107.5		28.9		15.2									25 0
USGS 90-2	9/90		2.7				0.1									
USGS 90-5	9/90		1.4		0.3		0.06									
USGS 90-6S	9/90		0.35			10.1	40.2									
USGS 90-6D	9/90					0.04	0.04									
USGS 90-10	9/90		0.4		0.3	0.04	0.08									
USGS 90-11	9/90		2.4			2.1	1.1									
MW-1 (MW1CITYWW)	4/90	0.2	0.4				0.03									
	4/90	trace	0.5			trace	trace									
	9/90		0.5			0.03	0.04									
MW-2	4/90		1.5			0.22	0.95									

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TABLE B-2
(CONT'D)

CORTLAND COUNTY MONITORING WELL NETWORK
SAMPLING RESULTS (4/90 & 9/90)

CORTLAND, NEW YORK

Well Designation	Date Sampled	1,1-dichloroethene	1,1,1-trichloroethane	1,4-dichlorobenzene	trans 1,2-dichloroethene	cis 1,2-dichloroethene	trichloroethene	tetrachloroethene	bromodichloromethane	methylene Chloride	toluene	xylene	benzene	trichloromethane	carbon tetrachloride	1,1-dichloroethane
	4/90	trace	1.1			0.4	0.9									
MW-3S	4/90		2.3			0.65	0.03									
	4/90		2.2			0.7	0.04									
dup.	4/90		3.3			0.22	0.06	0.02								
dup.	4/90		1.8			0.7	trace									
dup.	4/90		1.2			0.2										
dup.	4/90		2.5			0.3				0.2						
	9/90		0.8			0.3	0.9									
MW-3D (MW3CITYWW)	4/90		6.5			0.4										
	4/90	0.6	6.1													
	9/90		3.2			0.3	0.06									
PW3CORTWW	4/90		0.25													
PW4CORTWW	4/90		1.2			0.2	0.02									
	4/90	0.1	0.8			0.15	0.11									
	9/90		0.6													
T-103	4/90		0.15						trace	<2						
	9/90				0.3	0.4	0.2									
Jebbett	4/90					0.04	1.2									
P. Stupke	4/90					6.9	50.3									
	9/90					2.3	19.5									
	9/90					3.1	25.3									
PACE	4/90					62.2	100.6									
	4/90	trace			trace	74.7	88.0									
	9/90		0.2			32.2	37.6									
	9/90					35.0	53.0									
	9/90		0.15			36.0	59.0									
FITTS	4/90					0.54	15.6									

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TABLE B-2
(CONT'D)

CORTLAND COUNTY MONITORING WELL NETWORK
SAMPLING RESULTS (4/90 & 9/90)

CORTLAND, NEW YORK

Well Designation	Date Sampled	1,1-dichloroethene	1,1,1-trichloroethane	1,4-dichlorobenzene	trans 1,2-dichloroethene	cis 1,2-dichloroethene	trichloroethene	tetrachloroethene	bromodichloromethane	methylene Chloride	toluene	xylene	benzene	trichloromethane	carbon tetrachloride	1,1-dichloroethane
53 Green Bush	4/90		0.2				0.7	0.75								
	4/90		0.3			0.1	0.5	0.4								
	9/90		0.4				0.8	0.5								
Cortland Co. Office	4/90				0.3			0.25			trace			0 7	<0 2	
Old Hess	4/90	0.3	0.5								4.5	2.0	trace			
	9/90		0.3		0.4	0.06	0.1				42.5	5.3	2.1			
HSBUSGAR	9/90											0.5				

Only wells in which detected constituents were present are listed.
Concentrations are in ug/L equivalent to parts per billion (ppb).
dup. - indicates duplicate sample

TABLE B-2
(CONT'D)

CORTLAND COUNTY MONITORING WELL NETWORK
SAMPLING RESULTS (4/90 & 9/90)

CORTLAND, NEW YORK

Well Designation	Date Sampled	1,1-dichloroethene	1,1,1-trichloroethane	1,4-dichlorobenzene	trans 1,2-dichloroethene	cis 1,2-dichloroethene	trichloroethene	tetrachloroethene	bromodichloromethane	methylene Chloride	toluene	xylene	benzene	trichloromethane	carbon tetrachloride	1,1-dichloroethane
	9/90		0.05			0.4	9.5									
	9/90					0.3	10.4									
	9/90					0.6	11.4									
PTM	4/90					18.2	45.9									
	9/90		0.2			10.4	25.3									
	9/90		0.5			11.0	30.6									
OVDDOOR	4/90		3.1			14.9	49.1	2.5								
	4/90	0.4	5.8			15.8	39.3	2.2								
	4/90		3.1			13.5	46.4	2.8								
	9/90		6.5			12.5	43.2	3.1								
	9/90		6.3			10.9	37.4	2.0								
SUBST	4/90					17.3	53.8							0.3		
	4/90	0.15				23.0	47.2	0.3						0.3		
	9/90		0.2			15.4.	37.3									
	9/90		0.4			15.4	49.6									
SPCA	4/90					13.0	71.0									
	4/90					12.6	65.1									
	4/90					13.2	44.9			1						
	9/90		0.01			6.9	30.5									
	9/90		0.3			14.6	52.5									
	9/90		0.04			16.0	62.8									
Mobil	4/90	0.3									0.8	trace				
Pauldine	4/90		3.2			8.5	17.2									
	4/90	1.1	4.3			11.6	17.8									
	9/90		1.2			5.1	6.9									
Petrella	4/90										0.1					
Cortlandville #3	4/90					0.14	<0.1									

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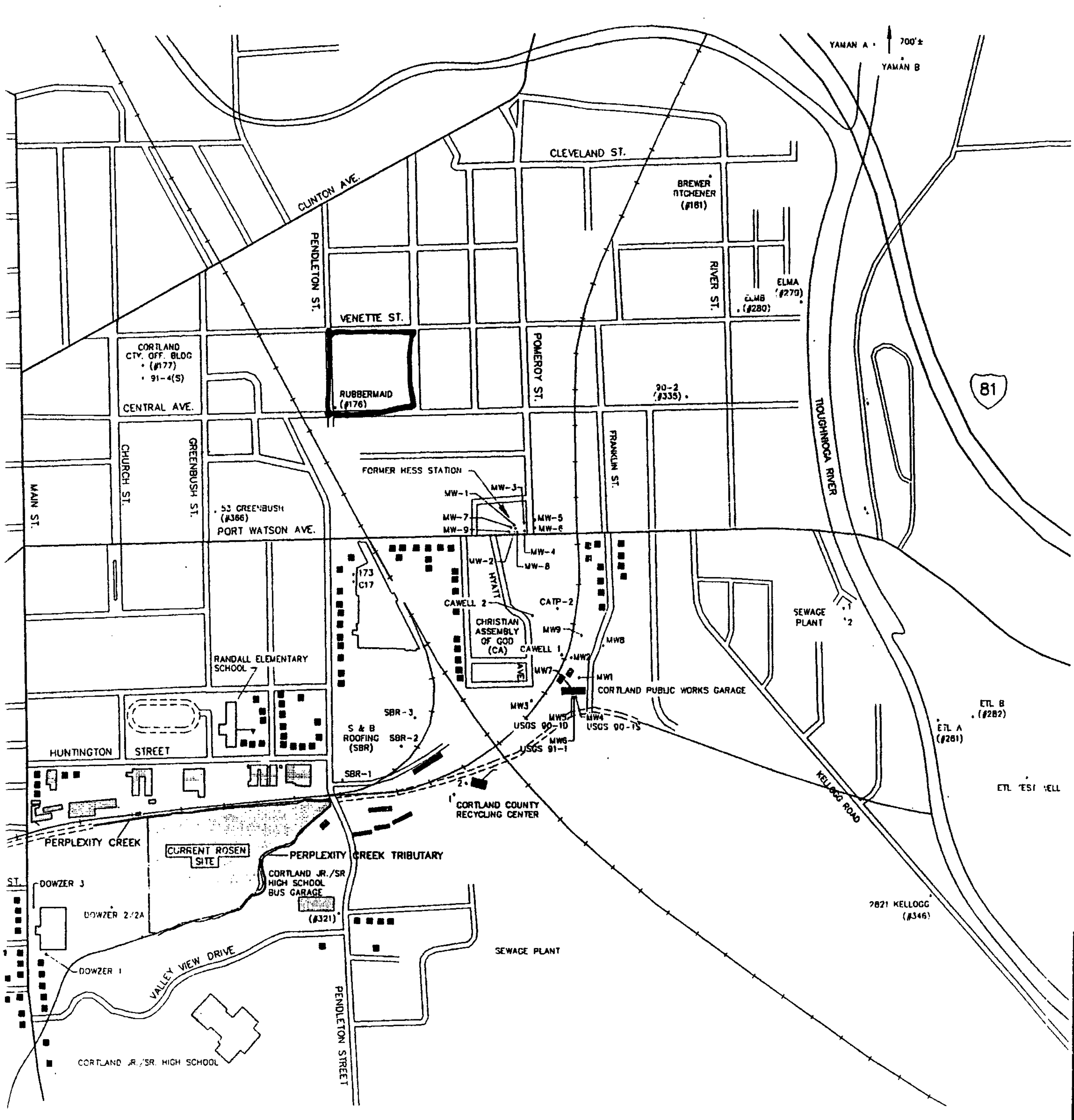


LEGEND

346 • REGIONAL WELL

====== STORM DRAIN

NOTE: FIGURE PRESENTS REGIONAL WELLS CONSIDERED HYDRAULICALLY DOWNGRADIENT OF THE ROSEN SITE OR HYDRAULICALLY UPGRADIENT AND IN NEAR PROXIMITY TO THE ROSEN SITE. ALL LOCATIONS ARE APPROXIMATE.

SCALE

800' 0 800'

BLASLAND, BOUCK & LEE, INC.

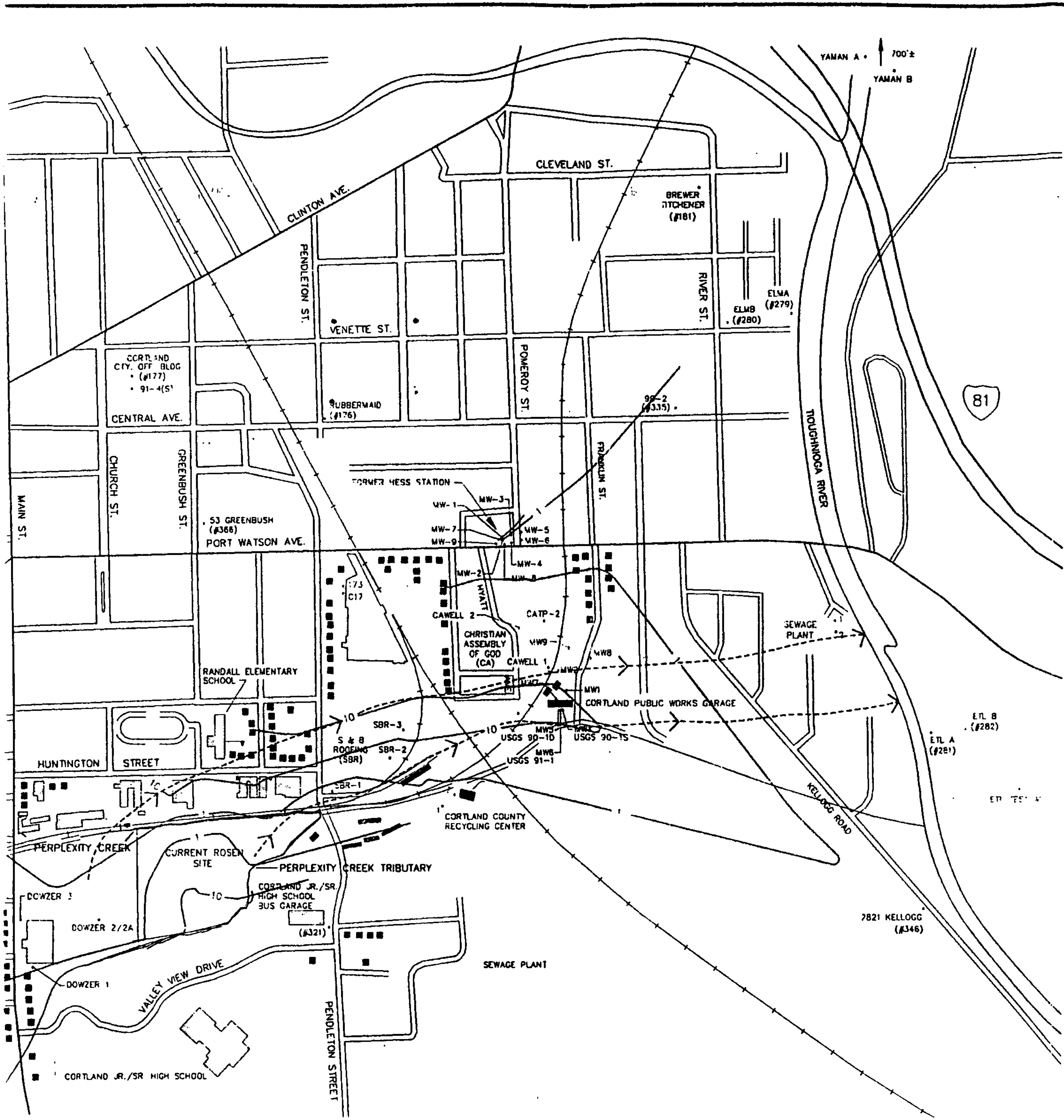
ENGINEERS & SCIENTISTS

ROSEN SITE
CORTLAND, NEW YORK

REMEDIAL INVESTIGATION REPORT

REGIONAL WELL LOCATION MAP

FIGURE B-1



LEGEND

YAMAN B REGIONAL WELL

STORM DRAIN

TRICHLOROETHENE CONCENTRATION LOGARITHMIC CONTOUR LINE (ug/L)

GROUND-WATER PATH LINES ORIGINATING FROM THE UPPER AQUIFER AT THE ROSEN SITE FOR AVERAGE RECHARGE CONDITIONS (MILLER, FEBRUARY 24, 1994).

NOTES:

1. LOCATIONS ARE APPROXIMATE.
2. ANALYTICAL DATA FROM BOTH "SUITABLE" AND "NOT SUITABLE" REGIONAL WELLS IN THE UPPER OUTWASH AS SET FORTH IN TABLE B-1. THESE DATA WERE ANALYZED AT VARIOUS TIMES USING VARIOUS METHODS; THEREFORE, THIS CONTOUR MAP SHOULD BE CONSIDERED AS A QUALITATIVE REPRESENTATION OF REGIONAL CONDITIONS. ANALYTICAL DATA FROM SELECT ROSEN SITE WELLS (W-01 THROUGH W-07, W-10, W-13, W-17, W-18, W-24) ALSO INCLUDED FROM FEBRUARY 1992 SAMPLING EVENT.
3. 1/2 DETECTION LIMIT WAS SUBSTITUTED FOR NON-DETECTS.
4. ONLY WELLS SCREENED IN THE UPPERMOST PORTION OF THE UPPER OUTWASH WERE INCLUDED.
5. ANALYTICAL DATA CONTOURED USING DCA, A COMPUTERIZED CONTOURING PROGRAM.

SCALE

800' 0 800'

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

ROSEN SITE
CORTLAND, NEW YORK
REMEDIAL INVESTIGATION REPORT

QUALITATIVE REPRESENTATION OF TRICHLOROETHENE IN GROUND WATER

FIGURE B-2